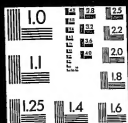


CENTIMETERS



14:1

Thomas A Edison Papers

A SELECTIVE MICROFILM EDITION PART V (1911-1919)

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at
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START

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**NOTEBOOK SERIES
NOTEBOOKS BY EXPERIMENTERS
OTHER THAN EDISON**

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Kinetophone and Kinetoscope Experiments -- A. M. Kennedy Books
Notebook, N-14-01-12**

This notebook was used by Absalom M. Kennedy during January-August 1914 as a daily log of experimental work on the kinetophone. Included are descriptions of tests with recording horns and various recorders, as well as notes on film cement, synchronizers, shutters, and varied lighting. There are also entries regarding the arrangement of sets, building new scenery, and setting up a dark room. In addition, there are accounts of demonstrations for Charles and Mina Edison and other individuals, along with descriptions of meetings with other laboratory employees doing work on motion picture development. Several experiments in this book are described in more detail in N-14-01-01.3. Some entries are related to work documented in Notebooks by Edison and Other Experimenters—Recorder and Recording Experiments—A. M. Kennedy Books. The notes indicate that Kennedy received instructions, comments, and suggestions from Edison and that he was reporting to Miller Reese Hutchison. Harry W. Doyle, L. E. Hammond, Victor Hurter, D. McRae, Henry A. Taylor, and experimenters named Brodigan, Buchwald, Johnson, and Tuthill assisted Kennedy, while J. O. Lyman and George J. Werner were involved in similar recording work. The front cover is labeled "Daily Record of Work from Jan. 12, 1914. to Aug 5 - 1914." The pages are unnumbered. Approximately 100 pages have been used.

Jan 12, 1914.

Starts J. McKee on Studio
Outfits. Found parts & started
him assembling Camera Drive.

Checked up films & reports received
for Road Showed with Butler &
checked his inspection.

Met Coyle & Foster & looked Road
Show over them. Took them to
see Mackinac & saw Maxwell &
discussed new plans for Road Show.
Maxwell inclined to taking Nature
Shows now.

Saw Butler about motor
starting device. No progress.

Saw Farrell & Mackinac on
new film cement treats. OK. Want
Engineering Notice on it.

Inspector interviewed Russian
Film from Rehearsal.

Had Butler, Dingler & film
room opened with record & memo
to Farrell as OK.

Ran show for Chas Edison at
night. Dictated memo & letters.

1/12/14.

Arthur starts in on making
Mr. E. german silver reels & shoes.

McKee starts in on getting
synchronizer ready for outfit.

Victor starts having hard time
with motor starter.

Law Langley on Establianal
Apparatus returned to Electrochemical Dept.
Brought out 10 reel of stock on
clips to hold Kristophone hand telephone
in Booth. Langley will attend to this.

② Nestinghouse good design of induction
motor starter. ③ reel of other than
cast iron grids for rheostats.

Worked on solvent cement for
film. Mixture of 50% alcohol, 50%
acetone tried. Not always reliable.
Did not make good joints unless
used in excess.

Arthur starts on Mr. E's reel
& shoe. Make german silver reel
and chemically etched same.
Looked after inspection of film

Jan 14-1914.

Had Peter finish up inspection
"of films and deliver to shipping
dept.

Inspected Victor Kenter model
motor starter. Sum. Too complicated.

Ran show for Presbyterian Board
Publication - Philadelphia, Pa.

Interviewed Gripper who turned
up from Road show.

Went to New York with Tuttle to
inspect installation at 10-5th Ave
for show next Monday.

Get report from Tuttle on needs
for show Saturday Night next for

Edison Club at Washington Hall.
Discussed recording & experiments with
Taylor.

Jan 15-1914.

Tested out Mr. E's german oiler
pail and shoe. This has slight
friction. Quality good. Volume
not so loud as Rubber. ~~Instructions~~
Tut to grind shoe & race to get
and to restitch both deeper.

Made up sample of film cement
to match "Bue-dog" manufactured
by the "One Drop Oil Co. Chicago Ill.
This consists of-

3gal. Denatured Alcohol	.45	90
2" Acetone	.80	1.60
2" Benzole	.80	60

5/310
624 gal.

It applied as "Bue-dog" cement,
that is thick - generally to both
surfaces to be cemented. It makes
an excellent joint. Try cutting
down or out the acetone.

Saw Mr. Uguis, Operator why
wants to become installer. Nothing
learned from him.

Had Victor Hunter make up
sample steel tape to align
projectors as per memo from
Mr. Farrell. Finished up O.K.

Told Mr. Durand, with Langley
& Tanahan about Mr. Kubie's
suggested method of starting
G. C. motor on starting machine.
Legal Department does not want to
give opinion until commercial
model is made.

Checked up McCabe on Studio Outfit
Camera received and mounting same
started.

No films received for inspection Sent
Houmman down to Davis Dept.

Farrell requests Tenthill & D to be
at Committee meeting to night to
run film if Taylor did not show
up.

Made test photo for Synchromizer on
foreign letter.

Jan. 16, 1914.

Took steel strips for lining up
Kinetoscope brackets to R. Dept.
Met. Bldg. Repairs as not exact.

Received film & records from
Black Room.

Sent letter to New York to
pull show.

Sent Victor Burton to check
up South Orange High School
job - must tell them of Carter & Quate.
Saw Chapman. Showed new
Lynman ^{tailor} ~~tailor~~ for him. Showed
this and American Talking Pictures
to Jennings.

Sent out to Mr. to check up
machines there.

Mr. Luby undertook Motor Picture

July

Note to meet from Mr. Edison
about men for European Studio jobs.
Talked Kinetophone plans with
McChesney.

Started Burton on Kinetoscope
Shutters.

Jan. 26.

Doyle turned up from Studio and said Higham said him sure. Saw H. why said let him go. Will see about letting Doyle go to me. Churney & pulling Doyle on Studio assembly as he knows more about it.

Put Johnson to #10-5th Ave after pull records and to Grand Studio after Okalus outfit. Father wants changes on camera viz - tripod screw socket - put in on lens & stop to come through the hood.

Jan 27. - Put Doyle on Okalus Studio outfit getting this ready for shipment.

He needs extra

1 A.C. Motor for shaving machine
20 cells Edison Storage Battery
Rubber pads for amplifier

Checked out.

Put Johnson to Paul Shaded for Austrian record set.

1/27/14

Ran show for Mrs. Edison.

~~Subs. for~~ German ~~show~~

1/28/14. Finished checking
out except rubber stamping
and blanking to my.

Checked out Hernandez Antique
Outfit and sent to packing
Dept.

Ran pictures for German
Representatives. They go to
Studio with them to morrows.

1/29/14. Went to New York to show
Messrs. Amesbury and Ludwig the
Gene Studio. Left 7:30. Arrived
9:30. They arrived 10:45. Saw
Hughes. Showed them a trial
set up and made record of
findings were very good.
They complain however about
treatment; that they want to
see Mr. Nelson and Mr. Edison
and talk over what they have
to contend with. They complain
also that the phonographs
are not as loud there as here.

Got back about 4 Pm.
Saw Hammond & showed him
new pictures.
Went to Committee meeting. Ran
two talking pictures.

1/30/14. Took up looking after
German Representatives which
Muller.
After show for Edison Club
at Columbus Hall - Inspector
Lay out.
Took up Hammond's
complaints of European Cinetophone
material etc.

2/1/14. Went in Mf. - Met Mrs. Mel
Fakes, Mrs. Miller & Mrs. Sullivan
and went to studio with them &
show them around. Higham took
up record of Mel Fakes voice. Not very
good. Enunciation clear but not
enough power in it.
Met Messrs. Anselmi and Ludwig
with the baby transformer and his

husband at Hoboken and came
on to Orange with them. Found
Committee Room occupied so fixed
up Raf demonstration room to show
them the German subjects. Afterwards
went to Committee Room and ran
over the whole list. They decided
on the prints.

Self

2/17/14.

Tested out Edison Economy
Transformer against Fort Wayne
Compensare and found the former
generally superior.

Started Steel Strip to line sprockets
with aperture plate on model
D Kinetoscope

Work on Studio Outfits.

Started Fitchie on magnetic
Reproducers.

2/18/14.

Returned Port Wayne Compensares.

Work on Studio Outfits.

Check up Magnetic Reproducer.

Taylor & Brodigan came in.
Arranged to film lacking pictures
for them.

Spent Hammond on Flasherless
Shutters.

Instruction and Exhibition of
Kinetophone Subjects to Taylor and
Brodigan.

8/19/14.

Saw to having Taylor & Brodegan
instructed on Synchronizing.

Tested Gundlach against B. L.
lens for Kinetoscope.

Inspected films patched by
Rettler.

Selected films for Committee
Room.

Sent Hammond to see about
Edison Club Show tonight.

Drew new diagram for
Potable Photostat.

Inspected new films of
a Mutual "misunderstanding"
and cut for Andrew Carnegie.

Committee night. Ran new
films.

2/22/14

Testing out change on portable
Phonograph for Road Shows.

Ran and film "10 days and the
Atlantic fleet".

Report of people of Bronx Studio
Voice tests by Mr. Edison and
select best voices & report to
H.

Prepare for show at 2:30 for
Mockbury.

Send Hammond to #10-5th Ave.

Send Max Blank came to hearing
to test.

Tutkile on magnetic reproduction

Next to Bronx Studio to see
take of picture.

8/1/14.

Arranged for show in Committee
Room

Ran "10 days with flax" for McChesney

Ran new films "Zamburisti" and
Hoffman's Erzählungen for McC
Hutch.

Checked up Clow on Gauge.

Checked up Doyle on Shibus Quifit.

Stated Schmand on film cement
- heater.

Note up record of actors from Mr
Edison tests.

3/24/13.

Sent Hammond & Johnson with
Ford Car with apparatus for Union
League Club Show.

Finished up Combined D.C. and A.C.
Photostat for Road Shows.

Finished up strip for aligning
sprockets with aperture plate on
Kinetoscope.

Ran Hoffmann Organizing, Samson
& Dalilah, Zamburletti #13, Co to
Jest Kinetophon. Persons in Comm.
Ran by for 1 days, Ring etc.

Finished up bottles for cement and
new film cement.

Ran domestic film for Humphreys.

8/25/41.

Hammond completed can seal.

Repaired in Rhinostat Film Cement
and bottles to meet for further
tests.

With ~~Hammonds~~^{Humphreys} criticizing talking
pictures.

Records for Humphreys up
stairs.

Ran new German Kinet
stuff for McKeeney.

Committee meeting on film
inspection

2/26/4.

Tried out all new Oesjma
polyjets selected best for Committee
and determined Auto.

Ran out Bepel Studio prints
with Humphrey.

Show Union League for MRS.
Got Hammond and Bepel off.

Got machines ready for
Committee Meeting.

Attended Committee Meeting

Phoned Stephen to come over
to Committee Meeting.

2/27/4.

Ray Bronx Birds subjects for
Humphrey.

Got Tuttle & Clew to check up
material for Cleveland

Got Rittel to #10 - where and
Clew to take out Union
League installation.

Inspector & Human Lectures
for Foreign shipment.

Turnished Humphrey information
on directing records of usages,
stage setting etc.

2/28/14.

Got Mattie and ~~off~~ off for
Cleveland.

Looked after inspection of
films & records.

Ran inspection for Humphrey &
helped him out.

Ninth Century Detective &
saw Annie Harold and
in front of Susanna
and J. Pagliacci. Fine - look
down the house.

3/1/14.

Went to meet. Met Mr.
Garrison and Miss Humphrey of
Huntville.

Got Taylor to come to help
to make records of Miss H.
Ran taking pictures for
them.

Took reproduced records
of Miss H.

2/6/14

Experimental Hearing. Fried
3'6" against 8'6" horns. Found
no difference.

Inspected films & Records.
Found no film & no record.
A film & B record.

Had amplifying, recording and
reproducing machines worked
on.

Ran German subjects for Gall.

Found heretofore:
that about 20, reproductions better
with recording machine on the
floor in place of at standard
height. If the voice is apparently
aimed at floor about half way
to recorder, results are best.

That reproduction is better with
less tendency to bleed is less is the
person recording. Balance on
balls of feet in place of standing
with heels on floor.

3/11/14.

Spent most of day experimental
recording. Got reproducing
machine in shape.

Tried aluminum lever arm
in amplifier in place of
steel. Got better quality.

Taylor tried putting diaphragm
on reproducing machine to
get better. Got oil on
amplifier reel & put out of
commission.

3/2/1

#5 Recorder Tester

Mica .0046

2 Gasbits

Nax Sealine

Nax & Sapphram

.028 Sapphram

A Recorder

Mica .0035 x 1.000

2 gasbits

Nax to gasbits

Shells & Sapphram

Recorder Head Standard 138

Tests if these show that the
recorder holds down blasts
very well but is weak

"A" recorder blasts easily, is
good and loud. Reproduces
blasts well.

Recorder #62 (Payton)

.0045 - 2 gasbits

Recorder #63 (Payton)

.0045 - 1 gasbit

3/10/41.

Record #62 just test very full.
Should be good with thin voice

Record #7 - .007 - ok same standard.
This record is very weak. Should
not be used

Records #3-62-63 - tested with
phonograph record of Hoffmann's
Engelungen. 3 appeared generally
best. 62 good on high but not on
on low notes - 63 more even but
not so good as #3.

Records of Miss Dunwoodie

#1 - Records #5 -

#2 - " #5 -

" all at 10'
Last Case of Summer"
even Tom

Miss Dunwoodie prefers #62
Record
Annex prefers #3 Record.

9/12/44 - Tuesday

Test of #1

Amplified same master regular and with aluminum arm, rubber to weight and direction of manual motion reversed.

Apparently the first named had more quality but less volume. The second had more volume but less quality.

Mr. Pierson preferred the latter or standard.

Test # 2

Test of Records #1's 3-1-A.

#3 - Standard eye 0025 mica

#1 - " " .0046

A = 1" diameter .00275 "

A is most sensitive but shows a tendency

to blast

#3 is far open tone but still says back in horn

#1 seems to be the most satisfactory.

Test of Records #1's 3-1-MK

3-1 as before. #MK is good

Show at Plainfield.

3/4/16

Listen to tests of recorders.
Found out about Dape.

Make up recording.

Go to Mr. Humphries on
master record.

Go to Brown Studios to run
pictures for actors and
take Redutizans camera to
Bingham.

3/16/13. Monday.

Test out Shuttles for Race.
Look after inspection in
Committee Room.

Look over Opus Libreros.
Spent film day out with
Humphreys.

Get Strage Ballroom charged
Amperex promised to have master
on tape and get rid of chips.

Test new rubber lined diaphragm
of Taylor. Holds beats fine
but not sensitive enough.

Test recorder #3 of J. Doyle.
#7 promising - sensitive. #9
Not.

Test #9 - #1 & New Rubber Recorder made
own.

#9 good

#1 Standard

* Rubber very promising. Seems
to throw tone but better than
others.

Found metallic particles in record
in this test however and traced
it to recording horn.

3/17/14.
Trials of new recorders.

Made up new recorder with
aluminum window as suggested
by Mr. Parman - Apparently much
more sensitive than regular
Pomany. Will carry on further.

Test of same recorder
1st with rubber window
2nd " " " " with ell.
3. " " " " only "
4th " metal window

#2 apparently least but
only slightly. The difference
seems to be that while the
rubber window adds slightly
to the sensitiveness of the
recorder its poles from the
quality of the tones.

Further listening to results
at night seems to show
that the rubber reflector in
window while apparently

making the recorder more
sensitive does so by adding
a rattle or tone to the regular
at the expense of quality of
the regular recorder or at the
expense of getting out airtones
Taylor always quit M&H
night.

Letters to Kusselaar & Kimmelman
Listened to Records & cleaned up
catalogues

Made piano records with
various recorders.

5/18/14.

Continued to Doyle work on Amplifiers.

Saw Reinhold on photography etc. of last batch of Acina Studio subjects.

Suggests camera men come out here & see developing operation for final instruction in depth of developing & appearance of good negative. Suggests making standard prints for men to compare with.

Write Report to Mox on last lot of subjects.

Experiment with Humphries on how best to concentrate sound. Also his suggestion of side and curved reflectors to help concentrate sound.

Got for Foreign Department
Lino and Aluminum Drive
Mail for St. Petersburg Studio.

Night
Test Records, Doyle's Voice & Piano

#1:

#8

#10

#11

#7

#15 8 and 11 apparently the best

Test Records, Doyle at
8 ft - Kennedy at 2 ft

X #7 poor - sensitive of ear
#8 good
#10 good but sharp - "
X #11 fair
#1 good - holds down -

Test Records - Doyle at
8 & 10 ft - Mistle & Piano

#1 good in voice - fair piano
#8 good - more sensitive than 1, not so good on whistle
#3 good - throughout
#10 good - whistling best

Test Records

	Days	Speaking	Whistling
	70	80	80
#10	70	80	80
#1	80	80	70
#5	75	85	90
#8	80	80	80

sentences
half sentence
fully another
" "

3/19/44.

Test of Aluminum arm on
amplifier. Dayle Sugars Cont + piano

- 1 - Regular arm @ 96 R.P.M.
- 2 - Alumin. Arm at @ 96 R.P.M.
- 3 - " " at 120 R.P.M.

Dayle and Kennedy agree that the
aluminum arm gave less volume but
more natural tone. That 120 R.P.M.
is a little louder than at 96 R.P.M.
and is more pleasant.
Pierman decided that #1 was the best
of the three.

Another test of Same on Miss
Dunphy's song -

- 1 - Regular arm @ 96 R.P.M.
- 2 - Aluminum " @ 96 R.P.M.
- 3 - " " @ 120 R.P.M.

3 was best - 2 second - 1 third.
and 7 much more natural than 1.
They not agree with Pierman.
Dayle agrees that #3 is best in
each case.

Doyle made up rubber tube
records with tubing furnished by
Purman. Current tests show this to be
an excellent record, sensitive yet
does not bleed.

Night.

Committee Meeting. Pictures
show up very well. More fleshy
than usual.

Ran Tales of Hoffmann for Road
show with Tachell
Taped out Rubber Diaphragm
against +1 Record. Rubber
apparently the better.
Cleaned out old used blanks.

Reorder #11

Mica 0055S (straight) - standard -


Reorder #12

Mica 0028F (Conane) - Standard

Reorder #7

Mica 004F (straight) - Standard -

Reorder #13

Mica 0066S (straight) - Stylus slightly bent
towards west 

Reorder #1

Mica 0045M (straight) - Stylus projects sharp
from arm

4/10/10 Tooty #11 Mrs Dunwoodie - Good
 " #11 amk - good
 " #7 amk - good with fuller than #11
 " #14 amk - good and full (distended)
 " #10 amk - good - not quite so full
 " #11 amk - good - very full (dist)

4/10/10 Tooty #12 Mrs D. - Good - repressed
 " #4 - " - Good - very full.
 " #2 - " - Good - full -
 " #12 - " - Good - full -
 " #10 - " - Good - not so full.
 " #11 - " - Good - ^{very good}
 " #12 - " - Good little greener than others
 " #12 - ^{very good} N.B. some
 " #2 - ~~amk~~ ^{discovered} seems a little tubby
 " #12 - " - Good, not quite so
 " #13 - " - full as #12 but true in tone
 " #13 - " - Good. Not quite as
 " #13 - " - full as #12 but true -

May 1 - 1914.

Finished up 6 records for German
group.

Tested out records by Miss Summerville.

Go to Carnegie Hall for Ellery Sanderson.

Of this

Artha Millston - Soprano
was good. Fine enunciation, voice
fairly good. Little throaty on
luscious notes. Accompanist mechanical.

Alfred Ramlanti - cello was
rather squeaked on a few times and
his instrument was very metallic
and rattling. His accompanist
was mechanical.

Clarence de Dams-Roger, Violinist.
Fair, Accompanist excellent. Soft
touch and with expression.

#5 Buschwald - Shmied excellent

#

May 7.

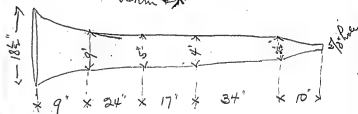
Experiments on Recorders.

Buschwalts #1 against #10 Standard.
This recorder showed up little thin and
will be changed.

Experiment on Horn:

Compared experimental horn #1 with
standard horn. Using same recorder,
distances, voice and all other conditions
same, horn #X was much thinner
than the standard.

Horn #X



May 3.

Got out the new long horns for
Nerves to try out.

Sent Doyle to New York for information
on stage props, painters, scenery,
etc. Obtained

Electric Cigarettes

Klug Bros - 240 W 50th St.

Paints

Rudwig Chemie - 388 Bway

Stencils

Stevens Co. - 27th St & 6th Ave

Costumes (

Horace Miller - 263 S 11th St. Philadelphia

Costumes (not military)

Tams - 1600 Broadway.

Hardware (Base

A. W. Koster - 4th St & 6th Ave.

Manhattan Co - 24th St & 3rd Ave.

Artificial Flowers etc.

General Flowers & Decorating Co

328 W 49th St.

Lerman tested out camera for focus etc.

Set up camera and Reprodu in position

Fixed out Amps

Made trial take of pictures

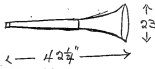
Chalmers
and took up matter of
getting a new camera
and a new film
and a new battery

May 5th

Tried out recorders on my soft
talk or representatives of Bell
Telephone Co.

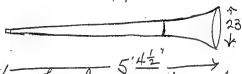
Tried out Special Horns as
follows. Used Humphrey at 6 ft.

Horn #1 Regular



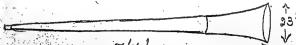
Used Rorden
(Horns) #10
on all tests
Horn #1 as
standard.

Horn #2 Special



Bell same
as above

This horn proved much fuller than #1
Horn #3 Special.



Fuller than #1. Not so full as #2. Fine definition.

Sp/14.

Tests of camera for exposure
inside with regular
are lamps.

#1 @ f 4.5

#2 @ f 6.3

#3 @ f 9

#4 @ f 12

#1 gave apparently the best
exposure.

Test for experience in running
camera and simultaneous
recording.

① Mr. Humphreys.

② Miss Dunwoodie (take up failed)

③ Mrs. Dunwoodie

④ Mr. Humphreys.

Buchwald made up
#5 Recorder. Tested little yellow tan standard
#9 " " " thinner " "
#3 " " not tested.

3 Nights. Came back with
Hymann and made the
following tests:

5/5/4.

Tests of camera for exposure
inside with regular
arc lamps.

#1 @ f 4.5

#2 @ 7 6.3

* 3 @ f 9

#4 @ f 12

#1 gave apparently the best exposure.

Test for experience on running
Observe and simultaneous
reading.

① Mr. Humphreys.

Miss Dunwoodie (take up failed)

③ Mrs. Punyodhi

⑭ Mr. Humphries.

Buckwald made up
#15 Record. Tested little yellower than standard

#9

7-1

40 7) Hessner

~~not Tester.~~

2.

Fights. Came back with
Gymn and made the
following tests:

5/5/14.

Test #1. Regular Lighting

and lighting top, bottom and side.

16-18-20-22-24-26-28-30-32-34-36 ft.

Diaphragm f 6.3.

34 lamps burning.

Test #2 Same as above except

Diaphragm f 9.

Test #3 Lights were tilted

so as to increase side lighting. Object marked

around on stage

Diaphragm f 9

34 lamps burning.

Test #4 Duplicate #3 by mistake

Test #5 Same as #3 except

alternate end & next to end

lamps out

Diaphragm f 6.3.

30 lamps burning

Test #6 Same as 5 except

Diaphragm f 9.

the tests described with positive results per.

5/6/14.
cleaned up herby & took pictures.

Fixed up small phonograph
for recording.

Made tests with Mrs. Demossadi
of machine for album

Committee meeting to act on film

Examining results of
last night

Took up matter of letting
Hawright and some of Stock
Company in to see talking pictures.

Test of Pierrans amplifier
arranged.

Buchwald - Assist Barnes in putting up machine
Repairing synchronizer.
Tester #5 Reenter. Good. 7 feel like #15

5/7/14.

Test of #7 against regular wax

- ① Test of 3 records, #s 10-12-15 on each, Humphries speaking and low notes on piano. Dubo #5, being sent for, Blue Antenna Records from. Dubo #2 being sent to compare with dubo #1 to compare quality of wax with celluloid.

- ② Recording, Humphries - on each and dubbed on regular wax.
Results. The reproduction from the regular wax is fuller more resonant and better. The #7 wax is apparently harder and tends to blast.

Results not however conclusive. It may be that #7 wax will be better ~~when~~ tested under the arc lamps.

Of the record tests

- #10 - Standard
- #12 - Very full
- #15 - Fuller & more expressive than

5/7/14

- #10. Try this with blue paper
to see if they are sharper.

Made up positive from yesterday's
negatives. Exposure & lighting seems
to be good.

Committee of Operators
Falmes, New Brunswick 22-

5/8/14

5/8/14
Pictures to determine focus of
lens and lighting

Voice Tests of Mr. Hamright
and Miss Kennedy.

Shower pictures to above.

" "Nathan Miller.
Went to DelKalb Theatre Brooklyn
to see about installation -

Saw Nebb pictures at Burton
and Harry Handon pictures at
Palace theatres. The Nebbi-
exhibition is much better managed
than ours.

Mark on Transitions.

Lyman made tests to determine floor line & focus.

5/9/16

Committee meeting of new films.

Got. after finishing up
dark room.

Buchwald made presides
#7 shade thinner than #15
#19 - N.G. took down.

Ryman made tests of regular
lens against lens in Dr. Hegham's
Camera.

5/10/14.

Laid out DeKaih Theatre equipment.

Tests of Pirmans Amplifier arm by Nephew. It is softer and more quality than regular arm at 100 P.M. At 150 P.M. the loudness is increased slightly but is still not as loud as regular arm.

Ran apur as for French representative. He agrees with us on grading.

Starts Tuttle on equipping Kunkelphone outfit in studio.

Bachwald put new governor in #6 machine & fixed same in working condition. Also cleared up gears in #6 amplifier.

5/12/14.

Had lamps changed further back.
Extension pipe made for this.

Straightened out storage batteries on
recording machine.

Changed lights 9 ft back.
Got in new floor cloth, grass mats
stage linens etc.

Made tests on Bernans Amplifier Arm-
Pound better quality and less volume
with it.

Met Managers from DeLoach Theatre. Show-
them pictures.

Committee Meeting for Hungarian Subjects.

Behaved on changing batteries for Bernans
Marking on #7 Amplifier.

Wright tests on Recording Machine.

Night - Hammons moved Lyman & Monte back
3 tests quick. Changed lights for
exposure. Exposures showed
static.

May 13/1914.

Tested out two falcow ball records.
for Mr. Piemann.

① Sharp and metallic. Not as full
as standard. Surface little less than
standard.

② Less sharp & metallic - better
than former but still not as well
rounded out and full as standard.
Surface practically same as
standard before and after
amplification.

With Committee - finished
Hungarian Subjects except
#186 of which the record was
lost.

Lynman made 4 tests with light.
Lighting seemed sufficient at
+6.3.

Tested voices of Mr. Palace
N. J. and Havor - who
can be used for character tests.

Finished up "Trapped". Not long
enough for 1 and too long for
1 period. New penwork.

Bachwald:

New needle on amplifying
machine.

Changed rear holder spring
arm on reproducing machine.

Made #19 Reson. Not tested.

Lined out new Reflectors.

May 14/14.

Asks Mr. Porter about nitrogen
lamps and reflectors. He will
send sockets and reflectors.

Worked on scenery with Powell.

Pyman set up x-ray features
to try lighting and focus. Read
papers.

Checked up DeKalb Theatre. Seems
to be in good shape.

Committee meeting at night.

Overhauled:

Set new needle in #7 amplifier
arm.

Made new needle arm for #6 machine.

Tested out Pyman's new amplifier
arm. Better quality and less loud
than regular.

May 15 - 1914.

New reflectors on and try aluminum.

Test of Girman type amplifier lens
arr. Good results.

Committee Meeting for
fifth Russian Installment

Made test run of feature

- ① Humphrey - Lecture
- ② Miss D. - Part 1 of Sumner
- ③ Doyle - Song
- ④ K - Chimes.

1st run. - Take off of camera
clipped on 15 ft. Nernst
#12 recorder. Too full. Blast.

2d run. Nernst = 10 Recorder.
Still loud & little plastic.

Next Radio out Kinetophone
Reproducing mechanism. (1117)

Ran Operco 1st. Film. Phonograph
patents. Pullup had.
Lyman submitted test of film -
fine.

5/16/4

Committu on # 186 A.

Finished up Dark Room & got in
peraphendia.

Get in mirrors.

Negative of yesterday's takes.

Bushwald.

Repair Tripod.

Amplify Tracked Blanks.

5/18/14,
Committee meeting on Sixth
Russian Installment of
Pictures.

Started Pinner on new set of
penery - paneled library &
parlor etc.

Made take of improved lecture
Completed no apparent hitch.

Richwald reports
General Mark on Penery,
Amplifying
Testing Record # 19. Result
same as #15 which is a shade
fuller than #10.

Tested Blue Amplifier against
Wax records. Blue Amplifier is
a little sharper. Found also
that a record which is full &
tutty in the amplifying room
is only good in the large room.

Tests of Methyl-hydroquinone against
Rodentia devespici. The m-d is
apparently much better.

5/19/14

Get ready for lecture telephone
talent = plan etc.

Lay out Arch for new scenery.

Hahnes man & arrange for
props.

Committee meeting on
the Russian Installation.

Fixed lighting tubes with still
and old moving picture
camera.

Bushwald:

Made Resistor #13 shade thermometer 15°

" #17 " 15°

Experimenting on light amplifier
arm.

Made new amplifier arm.

5/20/14.

Planning for the Lecture.

Recd of Glass. Head & Jr.

Set up & tried out complete Telephone apparatus. Photograph shows up weak for this place.

Buchwald:

Experimenting on Amplifying Machine
Recording with various Records
Made Records #6
Synchronizer on Projecting Machine
put in working order.

5/31/4.

Experimental work on aluminum
amplifier arm. Good quality but
deficient in volume.

Lay out method of continuous
recording.

Recorded & took pictures of Mr.
Heard - heavy door noise.

Ran reel & record of second
lecture. In and out focus
due to printing green star
flashing light which must
be removed.

Prepared for Committee Pictures.

Ran Talking pictures for most

Bruchwald: worked on new
aluminum amplifier lower
arm.

5/20/14.

Experimental takes of lighting

Get second camera ready for outside silent pictures.

Get wall paper for scenery use in place of paint as usual.

① More decorative on account

of pattern.

② Cheaper to set up.

③ Softer effects.

Hutchison over. Showed blue card compared with wax and #7 wax against standard. Requested additional blanks for test.

Took pictures of Maxwell & Mellessey.

Went to DeLuxe Theatre at night

Quahwaad experimenting on amplifier - new fusion Press in journal of Amplifier.

Amplifier tooked blanks

Strahl.
Tests for lighting

Saw Bob left about week.

Got painter and to new-york to
see White on scene painting.

Saw Reubens on new foreign
subjects from Austria.

Brachwald. Testing & changing batteries

Spool

Change lights & test new lighting.
Run trial again, Run.

Print Pinner to Famous Players Studio
New York. Came back in afternoon.
Keep him on present act.

Made tests of West Coast Island &
Nelson, England & Harriet of the
Edison Quartette.

Required furniture from Hobbs.
Set up to determine stage room
needed.

Duchwald:

Experimenting in Amplifying
Machine #6, new needle ailing.

Keefe & Norris put up Studio
outfit.

Night: Projected picture of
Hobbs singing bear song.

as possible and rent only their
special stuff.

Made test of Geo. H. Head Jr.

Made tape of 6 minute sketch.

① Geo. H. Head Jr. - Lumbering song.

② Maud Gandy - Last Place

③ Bob Kelt - Crosby on Oh Promise Me.

Made tape of MPA close up
in chair.

~~Revised~~ Repaired the
reproducing machine.

Experimenting on amplifying arm
of #6.

5/27/14.

Experimenting with diffused lighting from
white reflecting surfaces. Used
Photo Engravers lamps on large screen.

Experimenting with arrangement
of sets to get best results.

Experimenting arrangement of
camera and theinograph for
taking close on objects.

Made take of Hutchinson close up.

Buchwald:
Repairing Motor on Reproducer #7
bills on regular reproducer.

Retorts
Assisting Warner..

5/28/14.

Rehearsal brought up titles to be made.

Looked over scenarios that Humphrey left with Betty & selected four that may be used.

Ran takes of pictures made.

Experimented with recorder of Mr. Highams.

Tried out new reflector & ordered 18 for two back rows.

Made reflecting screens for lighting.

Loaned Jim White 100 ft film.

Bushwald:

Repairing Recording Machine #7.

Assisting Warner.

June 1, 1914.

Revised orders to make Portuguese
Lecture & Portuguese Faunt.

Laid out outline of Lecture. Got in
touch with Humphrey for talent.

Got scenery & props ready for Lecture.

Phoned Павел, Nemen & Pognan, English
Faunt for comparison. Laid out scenery
etc for Portuguese Faunt and ordered material.

Had English Faunt written up for
translation into Portuguese.

Got after special records lenses for Higham.

Test of alternating current light for Meschery.

Bushnell:

Synchronizing Reilly on #6.

New amplifier needle in #7.

Repairing recording mach #6.

June 8, 1914.

Saw Humphrey about putting on Portuguese
purses. Makes 10¢ per day.

Note parties about Portuguese talent. Got
in touch with MEX on same.

Ran picture of MEX. Pretty good.

Got new reflectors. These seem to give
a great deal more front, shot in
lights and are good and soft.

Got English of Faust for translation.

Experiments on new amplifier
arm. This is now better than the
standard. It gives a crisper,
fuller record.

Reichwald Tests on Amplifier #6
Testing Gerson Synchronization
Testing stop recording.

June 3-1914.

Work on scenery for Faust

Record of Mr. McCabe, 66 Congress
of Newark, N. J. - Slang, tramp,
rhymer parts. This man has fair
appearance and articulation. Voice
not heavy and loud enough to
fill theatre.

Method of Marguerite and Cross
actions in Faust worked out.

Another call by Mr. Jacobie. He
made some new points among
one a good one or so.

- ① In taking pictures take some
natural effects if possible.
- ② That the long, uninteresting
feature film is bound to go
and the short skilful films
will be the permanent ones.

Bushwaed:

Made usages for amplifying
machines #5, 6 and 7.

In recording and amplifying - practice
step recording machine for step
recording change of frequency etc.
Make recorder which has not
yet been tested.

June 1, 1914.

Tests of lighting on portrait taking
picture. Our model, Ned Caspary,
all so we can project these here.

Getting scenery ready for Tract.
Frame work of arch, cross background
and a background panel finished.

Met Mr. Maxwell & sisters and
made phonograph records of them.

Got finished copy of Tract
Scenarios. Take to Hammond to
take to Polyplot Co for translation.

Practising tape recording.

Projected new picture taken. Lighting
is better but still harsh & predominates
on top.

Rushward Tracing cloth thread looser
Cleaning & oiling recording machine
About 10 min in recording and
amplifying.

Project 125 ft. Record
to the Hammond Co.

6/5/14.

Hammond to New York after talent.

Experiments on lighting for
portrait taking pictures, using
magnesium lamps for lower
and front lighting.

Made take of Cal. Lett in
taking portrait.

Had Bess piano tuned.

Made test of M. Head Jr.

Rushward:

Inspect & clean pistons #6
Pace connection between diaphragm
and shoe.
Assist Nerner.

6/17/4
Experiments on new diaphragms
for recording



30

Main mica diaphragm standard
diameter .005

Over this second diaphragm .006
thick - 1" diameter

Both cut through with $\frac{1}{2}$ " diameter
hole. Piece of aluminum $\frac{1}{8}$ " diameter
.0075" thick stuck over with solution
of Canada balsam in benzol.

Gives tone just as loud & more
human quality, fuller & not liable
to blast as compared with #10.

#5 Another made similar but with $\frac{1}{4}$ " hole
& $\frac{1}{8}$ " aluminum. Similar results.

July 7-1914.

Work out with therm on reamplification. By careful pressing of the stylus to avoid surface as far as possible this can be done.

Dubbed - amplified masters of the five Vienna subjects which were weak and made them much louder - loud enough to be commercial.

Dubbed "Mrs. Murphy's Haveshee" which before was weak.

Tested out "Panachrome" portable are light from Allerton & Hadaway, 235 5th Ave. New York City.

This is a very light, compact, portable form of are light. Is rather swagile and delicate. Its actinic power, on test was slightly less than that of an Aristo are, and much less than that of an Engstrom's are. The light is well distributed however and on account of the lightness and portability of this lamp I think it will prove useful.

Tested #226A & B "Klyphon" Sels
Jan Joseph Balogh from Berlin.
These records are good and loud.
The recording and surface are
both good.

Tested 16" telephoto lens on
regular motion picture camera.
Difficult to adjust as this lens
requires about 10" focal length
for good work. Lyman also
made curious discovery that
it was impossible to focus
this with regular focusing
microscope. Went on why. Must
use this lens back on stairs to
get good picture.

Lyman tested 85 mm. lens from
Kymograph Camera on regular camera
for pathway work.

cut shows this.

- ② That for magnification (using .024 sapphire x .001 diamonds) as at present only one amplifying machine is required in place of 9 as at present.

After several trials, Warner made a record apparently as good in quality as standard bench .028" sapphire.

Records made Bob Let singing, AMK. at piano.

Lyman made pictures from studio windows with 5x7 camera set up on same aligner camera moved $5\frac{1}{2}$ ". The 5x7 prints were cut to $2\frac{1}{2} \times 3\frac{1}{2}$ ". Then mounted side by side it was practically impossible to make them appear stereoscopic to the unaided eye. Then cut & mounted about $1\frac{1}{8}$ " apart they appeared stereoscopic to the unaided eye after gazing at them.

for a time.

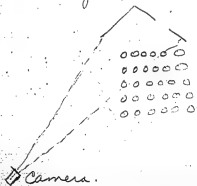
July 24.

Mimeu made new records with 50¢ sapphire. The quality is excellent surpassing anything I have yet heard on the kettephone.

A comparison of these with 'College Days' made the latter sound weak and phonographic.

Lyman made other stereo negative plates with camera 26" apart. Did not print.

Lyman arranged new set up with lights on side -



made exposures. These seemed to
show that wide open lens was
necessary. Tests showed lens
focus but good soft lighting.

Planned with him & Paul
Jenny for Hales of Hollenbeck act
order material & made program
of scene to send to get ideas.

July 25-1911.

Ryman made further tests with
side lighting prism.

Herman built up new readers and
mounted specimens on new recording
arms.

AMK. - afternoon devoted to
theory of stereoscopic photography
of mounted photographs.
Proved that the photos taken 26"
apart would not work stereoscopically.

July 27, 1917.

George Morris, made, with hanging
heads and feet, as at last previous.
Got some excellent pictures - more natural
than formerly.

Ran picture tank with birds arranged
as shown before. Results not good.
Focus bad and lighting was hard
and contrary in place of soft as
looked for.

Lynman pic in afternoon. The
dewy arrangement as above and
rearranged lights to same as in
Portuguese picture.

Got other new pictures but did not
get them.

July 28, 1917.
Set up & ready for microphotography.
Clark invited out.

Shawed between 1.45 pm. Photo. Mike
trials of microphotography. On
account of time & space.
Renger did not appear. I took
the picture.

New reflectors came operation. Made
trial take with them. #3 @ f6.3 -
#4 @ f9. - #4 @ f11. sent to Renger
to test & report on exposure.

Made up some film, securing screen
for camera. Renger did not like
because they looked bad.

Charles Marti sent over by Farrell.
Designed. Kitescope for Sloan & Chase.
Saw him about. Could not employ.

7/10/41
George Hervey made up new readers
and telegraph. print. with new ink
on "Come Back to Ben". Excellent
reproduction.

① Lyman made prints from George's
negatives. Put up samples for
test & new negatives.

② Put up at angle as shown.
Thiffel made test tube, new reflectors.

③ Put up straight as ① but with
5 Photocopying area on side
and made test tube & sent to
Kendall to develop & print.

Letter from H.S. Co came with
Halophane & enamelled metal
reflectors to test. Made steel
holders with 1000 watt - 500 watt
1/4 watt per sq. nitrogen filled
tungsten lamp in reflecting tube.

①	Alaphane #1500 Reflector	5000
②	D-Oiler Reflector	" "
③	No reflector	" "
④	"	52.5 "
⑤	"	55 "
⑥	"	57 1/2 "
⑦	"	60 "
⑧	"	62 1/2 "
⑨	"	65 "
⑩	Arctic Arc Lamp	
⑪	No reflector	67 1/2 "
⑫	"	70 "

Therms made up & tested out 3
new recorders. Bob says "Same
wash to him" which went fine.

These recorders now have about as
little surface as possible implied
only once in regular sweeps

7/28/14.

Lyman developed 19 photos made by
Patric of test of tungsten lamps

Of these #'s 1 and 10 appear nearly the
same density so that presents with
the Halophane reflector are
encouraging. These lamps are
however built to burn vertically
only so that to be useful they
can be used only for overhead
lights. What is needed for this
work is a lamp which can
be equally arranged to put light
into the scene from the front.

Had mirrors for stereo experiment
framed in Mr Mudds shop.

Saw test of film made with
all new style reflectors on
Aristo lamps. Shows improvement
in diffusion over old style
lamps.

Experimental results on brass
aperture plate with steel pack shows
that no static has been experienced
since using this and no pictures
have appeared out of focus.

In case of #1 Camera with steel
runners as well, no trouble
from static has been experienced
but emulsion sticks to steel slides
if the least rough.

Revers made up records as
follows:

#30 - Sapphire .004" diam. x .075" lap.

Main .004" x 1 1/2" built up center
of gap. Paper disc .005" x 1/8"

2 gasbets - mounted with wax,
and resin.

#70 - Sapphire .004" x .075"

Main diaphragm mica .005" x 1 1/2"

Secondary - under it .005" x 1/8"

2 gasbets mounted with wax
and resin.

On trial both compound will suit
#10 Standard

Am. went to New York in afternoon
to see Bailly - Wells about
pendrigo from Reynold Rushes
or other. Asked them to get price
from him and from Deppson
Harris on pendrigo for the
Collins & Carlan sketch.

July 21, 1914.

Made test to show difference in color value of make ups. using Light yellow (Powers) Medium Yellow (Brachwald) Dark yellow (Kennedy) Fresh (Lit). Negro-light (Dayle). In this Bengler played piano and Solih left sang. "Come back to Erin". Bengler, Keubel & Cuman had on no make up.

Picture (test) showed up well - clear & distinct, yet not harsh. Scenery showed up good. No apparent difference in color value of make ups on Powers, Brachwald, Lit or Kennedy could be seen.

Pergeff now made tests to determine if D34 or D34T records were better. First trial seemed to show that the D34T would "blubblen" on high notes. Subsequent trials using the best of D34 and best of D34T records. Sol showed that

The latter gave better quality.
Lyman made above test and
cleaned cameras.

8/1/14 (Saturday).

Bob Rest did not come. Nernis made
no tests but built up new records.

Nernis made 19 prints from still
picture of Test of Makhuks.
More difference on still than
on moving picture.

8/8/14.

Mimus has determined that comparing records with 028" & 024" sapphires, both at 100 R.P.M., that the 024" was fuller & more natural. Making the same records at 100 R.P.M. made the one taken with 028" sapphire sharper but did not change the 024" so much if at all.

Mimus made records with #30 Records 024" sapphire at 60-80-100-120-140-160 R.P.M. - amplified them at 80 R.P.M. & reproduced. Bob Riet singing with piano accompaniment made. The singing at 60-80 & 100 R.P.M. a little sharp and metallic. Riet good. The piano seemed good on all except 160 R.P.M. which seemed a little full & having too much resonance.

Lyman made exposure of reflecting mirrors for stereoscopic photography experiments. Plate taken at 5x. Both eye showed lack of depth &

sharpness. (Due to thin mirror
mounted in frame. Probably becoming
warped & has imperfect surface
to begin with.

Rimaw worked with Eason mounting
lenses in camera. We get Dellmeyer
f1.9 lens tomorrow.

Get ready to take Miss Elizabeth
Spencer tomorrow.

Received model of starting
device for a/c asynchronous
motor for shaving machines
from Mr. Simpson.

8/4/14.

Made 2 takes as Miss Elizabeth D. Spencer giving short recitation on marriage and song "Mud Pie".
Test of photography showed up well and the speaking part of the recording was good but with Buzley at the piano - there was interference between piano and voice which showed up both in tests and in records.
Mrs. Demps made piano for her with which she was much pleased.

To test out reason for above interference. Set test song - just as done at Twilight - first at piano same position as when Miss Spencer sang. No interference. Piano was brought closer. Still no interference. Was played louder. Still no interference. Changed to Church hymn so that hand full of notes in middle and lower piano register were used with great force. Still no interference. In other words there was interference

between Mosspen's voice and
piano even which experienced players
great agree and no interference between
Caly Kettovoice and piano even
when efforts were used to secure
interference.

Received Daelmeyer 75mm
lens from laboratory & tested.
When diaphragm open f1.9 has brilliant
illumination of ground glass
and apparently good depth
of focus. Tests made with it
seem to show good illumination
and excellent snappy image
but less depth of focus than
the Helios lens used.

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Kinetophone and Kinetoscope Experiments -- A. M. Kennedy Books
Notebook, N-14-01-21**

This notebook was used by Absalom M. Kennedy during January-May 1914 as a record of experimental work on kinetophone and phonograph recordings. At the beginning of the book are notes on voice recording tests to determine optimal stage directions, positions for actors and props, backgrounds, costuming, and stage size, as well as to establish procedures for testing exposure, focus, sound, and lighting before filming. Also included are entries describing changes made to kinetophone parts or procedures, such as amplifier lever arms and film developing formulas. Near the end of the book is an entry bearing the title "Record of Recording Quality of Actors Voices from Mr. Edison's Record," followed by additional entries containing evaluations of male and female singers at the Century Opera House. Employees who participated in the evaluations include Kennedy, O. Bing, Clarence B. Hayes, and Alexander N. Pierman. Numerous instructions, comments, and suggestions by Edison appear throughout the book. The front cover is labeled "Kinetophone Studio Work." The pages are unnumbered. Approximately 25 pages have been used.

KINETOPHONE STUDIO
WORK.

①. Preliminary Tests and
Information.

Report of 1/21/14 on Foreign
Studio recording contains

"Voice recording tests should be made
of all prospective actors and those who
do not record well should not be used
for kinetophone subjects." A record book
should be kept embodying the result of
these tests and these results should
also guide the stage director in
placing his actors; those with the
weaker voices being, as far as possible,
placed nearer to and more nearly
facing the recording horn.

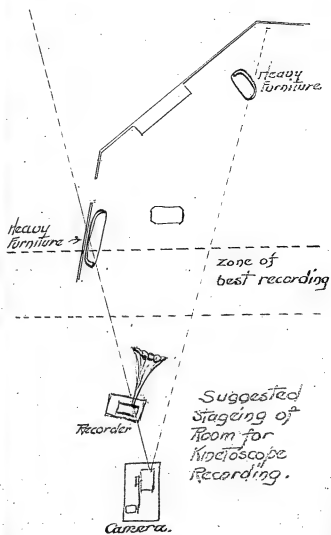
To this Mr. Edison added the
following note:

"Test records of an actors voice by
reciting something from a book, then
the record is to be reproduced in
presence of at least 3 persons who do
not know what is recorded and

who are totally ignorant of the subject matter". If acc 3. get 100(%) of all the words, then the actor can be used: 2.

Further from above report:
"Actors should be instructed to speak as distinctly as possible and louder than for ordinary acting and should as far as possible face the recording horn."

"The width of stage should be small so that the recorder may be as close to the actors as possible and a good lip movement will be given. Apparent breath may be given the stage by the use of heavy furniture at the ends and by the use of "perspective angles in the settings as shown in attached sketch". The stage may be made as deep as required provided the speaking actors be kept in the foreground near the recorder."



"When the stage is set up before any Kinetophone subject is taken, trial strips of film should be taken to determine the proper exposure and focus. At least some of the actors should be in this trial take in the costumes they are to wear.

"Before taking any subject in a new place, trial records should be made with the camera to determine the acoustic properties of the place, so that any echoes or other extraneous sounds may be eliminated."

On which Mr. Edison notes:
"The echoes become more disturbing the further the actors are from the floor but canvas and carpets stop it."

"Echoes in room, if bad can be eliminated by using scenery painted on canvas floor & stage, thick woven carpet & canvas sides to room."

BACKGROUNDS.

"Backgrounds should be dark. Painted scenery should be in dark colors, plain or with a small, repeated figure. Sepia or an equivalent brown makes an excellent background color. A skyline background should be avoided."

LIGHTING.

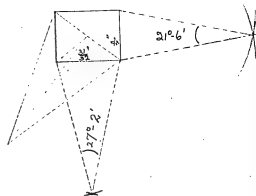
"The amount of light must be sufficient for the photographer to get correct exposure with stops not larger than f55, preferably smaller. This light should be evenly distributed, so that all parts of the stage are equally illuminated and must be well adjusted to avoid harsh shadows. "No light, direct or reflected, should shine in the camera."

DRESS AND DRESSING.

"White, should never be used, light or canary yellow being the lightest permissible color. The medium shades make best"

photographs. The photography
must bear in mind also that the
blues photograph lighter and the
reds, darker than they appear to
the eye.

ANGLES OF A 2" LENS.



Amplifier Lever Arms
Changes made.



When made by drawings, it appears that the relative distances from center to heel and center to sapphire on amplifier lever arm are not correct and should be as above. To get this distance the heel extension should be cut as shown and bent back until these distances are obtained.

ÉDILNOT

Edinol

31 grains.

Sodium Sulphate (des) 155 "

Water	3 1/2 %
-------	---------

Solution B-

Sodium Carbonate (des) 155 grains

Natur. 3 1/2 oz

For plates and Films

10% H - 10% B - 20% water

For Bromide and Velox Paper

1oz A - 2oz B - 3oz water & sufficient

10% Solution potassium bromide. 75 cc/p.

whites clear

More A than B increases contrast.

Mine B " A . . . patterns.

Underexposures - 1/2 A - 1/2 B without diluting

Over exposures - Restrict with few drops

of acetone sulphite 50% solution

Bronx Studio Trials

Miss L. Bourne- Edison gets 20% only Hayes gets only 30% N.G.

Miss Viola Knott
Edison 40%
Hayes 50% Explosive-uneven N.G.

Fred. Roland
Hayes 60%
Edison 40% Poor phone voice -Explosive N.G.

Lawrence Atthomson
Hayes 50%
Edison 50% Uneven-unatural -Explosive- Not Good

Edison 50% 5/2/10

Hayes-

Record of Recording.
Quality of Actors Voices
from Mr. Edison's Record.

FEMALE

- ① Laura Bennett:
 705 - N 170th St. - Tel 3388 Auburton
 New York
 "Perfect articulation": Edison & Hayes
 "Best ever heard". Edison.

- ② Alice Knowland
 Fort Lee, N. J. Tel 397m. Fort Lee
 Hayes 100% - Edison 95% OK

Mr. Kennedy-

The following two singers have been passed for the disc
 Mr. Edison remarks that they would be good for kinesiophones-

John C. Thomas- Baritone- (Olympic Park Orchest. Co)
 Fine articulation- High Baritone- 220 Hudson Ave- H. Y. City-
 Albert Farrington- High Baritone- 220 Hudson Ave- H. Y. City-
 Good articulation-

C. E. Hayes- 6/14/14

③ Miss Margerit Edison
311 W. 94th St., - Tel 5015 Riverside
New York, N.Y.

Pierman 100% - Hayes 100% - Edison 90%
"Her hissing consonants are pretty
strong and think they will go thru
our process".

Digham used her for first time
2/20/14.

④ Laura Dean
311 W. 58th St., New York, N.Y.

Edison 90%. Hayes, all.
"Cracked vaudeville voice". "OK for
comic parts". "Voice will come pretty
well on Kinetos".

⑤ Nellie Grant
to Edison Studio
New York City

Edison 80% - Hays all.
"She is pretty good".
Used in The Redemption
Which Shall It Be
Dutch Courage
The Dedication
Jacko Jake
Myo Manchip
The Rungles
The Kridis Secret
Sir Cyllinder Elopement

Mrs Robert Newb Lawrence
253 - W. 56th St. N.Y. City
Phone 127 Columbus.

MALE

- ① Ben F. Wilson
90 Edison Studio, New York City.
"all 100%". This man is O.K.

- ② Chic Bernham - Comic Opera Comedian
231 W. 52d St. New York City.
"Bernham, Hays myself get 100%". O.K.

- ③ Edward J. Peel
211 W. 109th St. New York City
Bernham 100%, Hays 100%, Edison 100%
O.K. for talking.

- ④ Jerome J. Shine
38 Rucklows, Astor Normandie, New York City.
Hays 100%, Ring 100%, Edison 100%
O.K. for talking.

⑤ Robt. Litt 96 Washington St. N. Orange
381 E 90051 New York City
Pierman 100%, Dayes 100%, Edison 95% OK
I have used him a number of times

⑥ Walter Cluxton.
834 W. 46th St. N. Y. Telephone 2967
Dayes, 100%, Edison 95% OK

⑦ Henry Netman.
449 W. 34th St. New York City
Dayes 100%, Bing 100% Edison 95%
OK for talking

⑧ Harry Knowles
476 W. 146th St. New York City. Phone 2910 audobon
Dayes, 100% - Bing 95% - Edison 95%
OK for talking

⑨ Louis Demuth
492 Pine St., Providence R.I.
Hayes 100%, Edison 98%
"Singing only, clear - has tremolo - but
singing articulation fair - ok for talking -
- possibly for singing certain things but not
in chorus as tremolo quess chorus work."

⑩ Bernhard F. Meyer. Conductor
219 E 52nd St. - N.Y.
Pierman & Hayes 100%. Edison 90% OK

⑪ W. B. Mainright
253 W. 55th St. New York City.
Pierman 100%, Hayes 100%, Edison 90% OK
Regular Edison Studios Actor. Has
played in "talkies".

⑫ E. F. Cochran (Ingram)
Club. New York City
Hayes 100%, Bing 90%, Edison 90%. Pretty fair

(13) Louis Arnold
122 W 49th St. Radio Burtel - New York City
Powers 100% - Hayes 100% - Edison 90%
OK for talking

(14) Herbert Grosse
144-63d St., Brooklyn, N.Y. Tel 68d Beth
Edison 90% - Hayes All. - "Pretty Fair Voice"

(15) Duffield Van Duzey (Bronx Studio)
Phone 9995 Columbus
Hayes 100% - Bing 100% - Edison 75% - pretty good.

(16) C. Dumbly
205 W. 107th St New York. Tel 100d Riverside
1st part reading natural voice E 100% H 100%
2d " reciting E 25% H 100% - Stage voice N. G.

Robert Melik Lawrence
253 - W. 55th St. N.Y. City
127 Columbus.

L. J. McCormack,
305 Queo
Brooklyn, N. Y.
Phone 5868 Newwood.

George Winter,
58 Clark St.
Glen Ridge, N. J.
Rand # 3857.

Mr. E says "Get Hutchison
He is a fine singer for
Kinetophone". "This man has fine
articulation".

John C. Thomas, Baritone (Opera Co)
"Fine Articulation" - Edison
Good for Kinetophone - Edison

Allert Farrington - High Baritone
2207 Madison Ave., N.Y.C.
"Good Articulation" Edison
Good for Kinetophone Edison.

Opera Singers at
Century Opera House.

Female

Lisa Euell - Soprano. Good voice.
Very pretty. Acts natural
and sweet. Not ~~stiller~~.

Kathleen Howard - Contralto. Good voice.
Showed record well. ~~Hanson~~
Acts dignified and sweet.

Emilia Clay - Soprano. Fair voice.
Saw as Wills. Could not judge
looks. Acting only fair.

Marguerite Sullivan - Contralto. Once
good in parts - at higher range.
Large woman. Not especially
good looking or good acting.

Berta Shalep - Soprano. Good voice.
Fairly good looking. Not
good acting. Shakes her
head too much.

Tolerance Vaughan - Soprano - Rich
voice but probably unused
with regard to it. Mouth
poorly shaped and will not
be able to enunciate correctly.

Cordelia Parkman - Contralto - Fair
voice. Not especially pretty.
Slip in acting.

Jayne Herbert - Contralto - Good
Voice - Good look & figure
acts natural & well

Joyce Scott - Soprano - Fair Voice
Fair looking, Good Acting

Dancers at Century
Opera House
Male.

Morton Adams - Baritone. Good voice
and excellent enunciation.
Large man. Good actor

Arville Harold - Tenor - Good voice.
Looks & acts well

Louis Krizler - Baritone - Fair voice
Looks fair. Acts well

Thomas Chalmers - Baritone. Good voice
Looks well - acts well

James Davis - Tenor - Fair voice
appearance & acting

Walter Heatty - Tenor. Good Voice
appearance & acting

① Signor Manuel Carvalho (Portuguese)
263 Regal St., Brooklyn, N.Y.
Phone 98 Main.
Made Dia. #10 - Apr 27/4.

② Mrs. Robert Kett
90 Washington St.
West Orange, N.J.
Made Dia #10 - Apr 28/4

③ Mrs. Dorothy Kennedy }
W. R. Wainright }
Mich. Steak Company, Orange, N.J.
Hill Plaza.
Made with Dia. #10 - May 10/4.

④ Ed. M. Fawc
346 E. 34th St. Brooklyn, N.Y.
Phone Blatnick 8661.
Diaphragms ① #10 - ② #12
May 13/4.

⑤ James P. Birch
64 Belmont Ave, Newark.
Diaphragm #10 - May 15/4.

⑥ Tests of talking for A. G. Bell.
Diaphragms ① #10 - ② #2
May 5/14.

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Kinetophone and Kinetoscope Experiments -- A. M. Kennedy Books
Notebook, N-14-08-05**

This notebook was used by Absalom M. Kennedy in August 1914 as a record of experimental work on the kinetophone. The early entries relate to experiments to determine how variations in speed and amplification affected the quality of the recording. Also included are notes on setting up scenery and making test exposures in order to determine the best focus and lens. In addition, there are tests of various screens and screen mounts, as well as new starting devices for the shaving machine motors. Several entries specifically indicate that the work was being done for Edison, while others mention experiments on stereoscopic photography performed for Charles Edison. Some of the entries are related to the experiments documented in Notebooks by Edison and Other Experimenters—Recorder and Recording Experiments—A. M. Kennedy Books. The notes indicate that L. E. Hammond, Daniel Higham, S. G. Langley, Charles W. Luhr, J. O. Lyman, George J. Werner, and employees named Buchwald and Essner were involved in similar work on kinetophone recording. The front cover is labeled "Daily Record of Kinetophone Experiments from Aug. 5-1914 to." The pages are unnumbered. Approximately 35 pages have been used.

Aug. 5-1914.

Experiment with records to test difference in quality at different fields of recording and amplifying.

Used Baby List singing "Come Back to Erin" with Amf at piano.

Recorded at 60-80-100-120-140 & 160 PPM.

Amplified these double at 80 PPM each time.

Then amplified them double at 40-53-66-80-93-117 PPM.

Results as follows:

60-40	- Voice metallic & raspy. Piano good.
60-80	- Voice very metallic & raspy "
80-53	- Voice metallic. better than 60. "
80-80	- " " better than 80-53 " "
100-67	- " " trifle " better than 100-80 " "
100-80	- " " better " " " 80-53 " "
120-80	- " good " better than 100-80 " "
140-80	- " good. Louder than 120 - Piano good
140-93	- " fair - loud " "
160-80	- " good. " "
160-117	- " fair. Louder than 160-80 " "

Put up set for Tales of Hoffman.
and made short takes.

Made portrait, full stage and
outdoor exposures with 75 mm
Dallmeyer lens. This lens lacks a
little in depth at f 6 as compared
with "Helios" lens.
At f 6.3 does not focus enough to
be objectionable unless with
very deep stage and prolonged
acting at back. Outside test
satisfactory. Suggest getting
a 50 mm lens of same make.

Aug. 6, 1914.

Bushward arranged double cameras for Chas Edison's stereoscopic photography take.

Ran takes including Elizabeth Spencer and Bobb Kett in "Come Back to Erin". Photography on these is excellent - apparently the best we have done yet - lighting soft and even. Every line of face - each hair of head showed distinct & clear. White shirt front on Bobb Kett's evening dress did not even give any halation.

George Werned off on vacation.

Tests of 75 mm. Dallmeys lens on comparator showed up same as previous reports. Good sharp pictures little less depth of focus than Leighttenders.

Lyman made positives of recent negatives.

Hammond tested out new starting device for a/c shaving machine motor. Made 1200 starts without a hitch. Will redesign hangers deep to keep from catching springs when revolute backwards.

Tested out scrim screen in front of regular aluminum screen. Cuts out directional reflection but cuts down light and gives uneven seek effect. Will mount differently so as to vary distances between screens.

Aug. 7, 1914

Set up made test of two camera method of stereoscopic photography for Chaco Edison. 60 ft of negative used for each picture.

This involved adjusting the floor lines of the cameras exactly and aligning the cameras so that the principal object exactly corresponded in each.

Tested out means of coating the wooden strips of developing racks with celluloid lacquer so that the developing solution would not penetrate the woods.

Had foreign studio outfits brought over and locked in room.

Aug. 8-1914.

Stude's father disorganized due to
men leaving and half holiday.

Checked out material and work
left with men and planned with
some of them about work.

Aug. 10/14.

Took down apparatus of stereoscopic photography test and put up camera for a take.

Saw negatives of stereo experiment. One little denser than the other. Laid out printing scheme.

Bernier worked on double amplifying. Got with Robert some "dear bowed down". N.P. Maus. Thin spots. Amplified all 1st dials - showed up good.

Another Reed same "Come Back to Erin". No waves. One Jump Out. Not much - not up to usual strength. Unable to explain. Saw Kuhn about place for Bushwald.

Aug 11 - 1914

Made tests and a take of Miss Mary Jordan, 533-W 113th St.

~~Tests~~ showed bad interference between pigns and voice. This was in part eliminated by changing the ~~accompaniment~~ to an octave higher for the right hand than was written. Record as made was not as good as has been made.

Permer found that the sapphire ball of his amplifying machine was loose. Also that the bearings were too tight.

Afterwards made excellent records of John. Pett. singing.

Points brought out here were:
①. Inspection of all machines including recording heads, amplified lever arms etc before making records.

- ② Need of carefully selecting the number and flammation of the accompaniment. If this is in middle register of the Piano or contains lot of notes played together, especially with octaves, the accompaniment should be changed to an arpeggio one and the right hand middle notes raised an octave higher.

McCheaney telephoned over to find what a record would cost for claw & chenger for a mob scene. Also for three records taken at 10th or more to be sent to the Bell Telephone Company.

Lyman found that shutter on Camera does not allow aperture with narrow angle lens. Essener made a new and wider one.

8/12/16.

Made tests with George Nemes
and trouble with recording.
Got some excellent loud records
with Bobb test.

Made up estimates for McKeeney
as to making record for
Blaw & Glengul.

Ran Chas Edison stereoscopic
picture. Very jumpy from
3 causes;

- ① Cameras 10' apart.
 - ② Inaccuracy of setting cameras
 - ③ Inaccuracy of printing position.
- Discussed with Chas Edison
another method of taking.

8/13/14.

Now made up new recorders, soft
aluminum .006" \times $1\frac{1}{16}$ " diameter, centers
to pins of mica from .001" to .005" -
 $3\frac{1}{16}$ " hole $1\frac{1}{16}$ " diameter.

Characteristics of these were that
they are not as loud as regular
mica recorders. They deaden the ring
of the piano and prevent interference
making piano accompaniment
possible.

Make excellent piano records
as each note can be distinctly
heard.

Made tests of lenses. Found necessary
to have stops in the tubes to prevent
extraneous light & consequent fog.
Gave tubes to camera to do this.

Made test of wide open & stopped
down lenses to show that the
difference in depth of focus.

So far have not been able to
get any definition out of the
16" telephoto lens.

Set up screen for Committee, Ran
K-11 & K-14. Photography on the
front is good. Recording shows some
911

interference but does not appear
nearly so bad which feature as
without.

Photography in K-16 (Miss Mary Jordan)
shows badly distributed lighting. The
background is too bright the foreground
and particularly the lower portion not
light enough.

Method of securing uniform lighting
all over stage

8/14/13.
Named, left out new records

#5, 20, 30, 40, 60 & 70

#20-30-60 were little sharp and weak

#5-40-70 were good and full, natural and excellent and did not show any interference with the piano.

Made trial record with these and will have blue record made for Mr. Edison to hear.

Record #s 208B, 212B, 214B & 218C which were Austrian records reported as much too weak for commercial purpose.

Hermes had remastered these and they now appear good and loud - excellent as commercial records.

Found that #237A record #237B film was sent here. This looks like a mis matched pair had been sent to Europe.

Remastered Mrs. Murphy's Keresztes

and made it sound then
ingenious. Not particularly good,
however, probably not commercial

8/15/14.

Further tests of aluminum center
recorders to diminish piano
interference.

Elimination tests to find which
recorder is best of the
following:

- #5 (038" needle) Standard
- #20 (024" needle) Piano not as loud
Voice little metallic
- #30 (004" needle) Piano louder than #20
Voice not so loud but more
natural
- #40 (004" needle) Piano good natural
Voice excellent.
- #60 (004" needle) Piano good
Voice more metallic than #20
- #70 (004" needle) Piano good clear
Voice full, good

Further tests showed #40 to be the best
at 70 mch.

8/7/4.

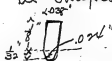
Therms made new tests of Beck
Kelson new recorders to determine
piano interference with new
recorders.

Armist. on piano Played hand full
in middle register.

Apparently #40 recorder (aluminum
center) had slightly less interference
than #10 (Standard). It is evident
however that other fingers (preferably
women) and accompanist must
be obtained as it was practically
impossible to get interference
even when tried.

Therms set up another arm with
new needle & sapphire.

It is evident that for double
amplifying with 0.24" needles
the ball in ampexen lens arm
should be shaped



also that the post. records both
for recording machine and for
sampling. should not be less than
5/8" to 3/4" long.

8/18/4.

Perkins set up amplifier with new long needle. This played very loud and gave considerable trouble. Took all morning to do.

Made records of a baritone singer.

Mr. Higham came & talked. Showed him new recording & playback amplifiers. He said the latter was good - better than he expected.

Amos tried several times to set up camera & focus but could not on account of other interference.

3/19/45

Nernu made further trials with aluminum centered diaphragms to accomplish

- ① Naturalness of tone & quality
- ② Diminish interference.

Did not get a recorder better than #40 which showed up best before.

Made record of Mrs. Belle Pett piano with #40; #10 (old standard) #40 showed better quality & diminished the piano.

#40 was crisp but the piano rang in too much and the voice was a little sharp. On account of old playing of piano, neither of them showed any interference.

Spent morning trying to get #5 reproducing machine up to the being used at Studio. Did not get the points out. Put Hammond on job. He did not succeed.

At night worked on printing
positives from negatives made.
Can do it but for reliable work
must make up own developers
etc. Found that positives must be
correctly exposed - about 9 sec.
at 6 ft from bowat magda lamp.
That the development must be carried
farther for positives than for
negatives to secure density.

8/30/4.

Mernul made new tests and records for non-interfering Mernul, #40 showed up best and proved that these aluminum centered diaphragms are non interfering, no compared with regular mica diaphragms.

Made takes with Dallmeyer f1.9 lens.

- ① with microscope focusing. Point of focus showed a little behind on scale v.g. - for 5 yds showed about 5 1/2 yds. Pictures taken with this showed focus slightly behind principal object.
- ② Taken at f 4-5.6 & 8 showed that f5.6 was nearest correct exposure.
- ③ Retake with shutter just forward of 5 yds gave beautifully clear lens pictures.
- ④ Used same lens wide open - 2 Arctos & 2 side lights. ① Backed eye focus. Showed on background. ② Setting indicator little ahead. Shows focus on foreground.

③ Indicator on Egd mark. Shows
better than either of others but
not perfectly sharp.

8/21/14.

Therms worked on new interference
readers. Got warm on test
which proved in working
machine.

Amik made steel stage take with
Dallmeyer 75mm lens at $f4-5.6-8$
later development proved all
undisposed.

Made take of chair with
Helios 45-5.6-6.3. Later development
proved all undisposed.

This because
sep film (from Statis)
Short Ends) was
used. Should use
fresh film

8/25/11.

Herner made pearls with #10 & #40
recorders to show difference in interference

AMK made out of focus bow takes
with

① Helios lens @ f 25-18-12.

② Dallmeyer " @ f 16-11-8.

Developed all films in afternoon
& showed that ~~of~~ ①
f18 was nearest correct exposure
out of ② the correct exposure
lay between f8 & f11, showing that
f9.6 would be about right.

These exposures
values are wrong
because old film
was used.

8/24/14.

Morris made up new follow
ball recorder. Made several trials.
results good. Seems to be louder
than floating recorder and more
solid. Has a little more surface.

And made photographs:

1
Dallmeyer lens. Interior stage
all lights burning. Lens at 10 yds.

- ① f 4 - overposed - from trifle back
- ② f 5.6 - about correct exp. " "
- ③ f 8 - trifle underexp. " "

Correct exposure would have been f 6.3.

2
Dallmeyer lens. Out of window. Bright
Sun. 11:30 am. Lens at 10

- ① f 5.6. overexposed badly
- ② f 8 " "
- ③ f 11 " "
- ④ f 16. overexposed.

3

Dallmeyer 75 mm lens. Collect on road
from Eagle Rock to Montebello. 4:48 PM.
In shadow of trees & hill.

- ① f 5.6 under exposed - focus good
- ② f 8. Obviously " " "
- ③ f 11. " " " "
- ④ f 16. " " " "

4

Dallmeyer 75 mm. Sky & distant trees. 5 PM. ∞

- ① f 8 over exposed - focus good.
- ② f 11 " " "
- ③ f 16 correct " " "
- ④ f 5.6 slightly under. " "

5

Dallmeyer 75 mm. Open. Sun under cloud-
y green shrubbery background. 7yd.

- ① f 5.6 good exposure - good focus.
- ② f 4. Tree overexposed - " "

8/25/14.

Miriam worked on fellow back recorder.
Ransom same, much sharper as compared
with floating weights. Had some
blinds and bed spots also.

Amr. made the following takes:

Helian lens out window to check
over exposure of Dallmeyer lens
of day previous.

- ① f/12 - Bit Sun - 10:45 am. Distinct rat ♂
- ② f/18 " " " " " "
- ③ f/25 " " " " " "

- ① Showed excellent exposure
- ② " good "
- ③ " under "

Comparing these with edition
X of yesterday, pictures taken at
same time of day and under same
conditions with Dallmeyer lens,
proves that if the exposure of the
Helian lens is correct, the ratings on

the Dallmeyer lens are much too low
or that this lens is about 3 or 4 times
as fast as the Helios.

With 3 Engravers arcs burning,
Made ex.posure with Hyman meter.
Showed 8 seconds, which for f90 plate
gives $f\frac{5}{8}$. Exposed at $f\frac{1}{4}$ with
Kodak prints in following:

- ① Dallmeyer lens to check above -
- ② Test Cooke 6" lens. Focus by eye on
ground glass. Distance 5 yds. $f\frac{1}{4}$ used.
Focus not sharp. Exposure good.
- ③ Test Excess 6" lens. Focus by eye on
ground glass. Distance 5 yds. $f\frac{1}{4}$ used.
Focus, not perfect but best of the lot
focused this way. Exposure good.
- ④ Test Helios 6" lens. Focus by eye on
ground glass. Distance 5 yds. $f\frac{1}{4}$ used.
Focus not sharp. Exposure good.
- ⑤ Test B & L Zeiss Jena lens. Focus by
eye on ground glass. Distance 5 yds. $f\frac{1}{4}$ used.
Focus not perfect, better than 2nd. Exposure
good.
- ⑥ Test Cooke 16" Telephoto. Focused
by eye on ground glass.

Focus shows not good. Exposure OK.

8/26/4.

Morris worked on follow ball recorder. First results poor. Better ones better. Got him some .004" x .006" sheet aluminum and some follow ball heads.

AMK. Experimented with focusing on ground glass and looking at this image with microscope. Also working out the telephoto lens.

1
Telephoto lens at about 40 ft. Focused on ground glass with microscope. Result poor. Not perfectly sharp. Exposure excellent.

2
Telephoto lens out of window at junction on Eagle Rock about 1 1/2 miles. Focused on ground glass with microscope. Result fair to good. Exposure excellent.

3
6" Express Lens. Focused on ground glass with microscope. Focus fair. Apparently on foreground. Exposure OK.

4
6" Express Lens. Focused by aerial image method. Focus good. Exposure OK.

8/27/4.

Therese worked on following her
method of recording. Results good.

And made tests of methods of
focusing and of use of exposure
meter. Last shows up excellent.
All exposures good. Have not
yet found reliable method of
focusing other than graduated
lens.

Set up for Committee meeting.

8/28/14.

Mermer made up new Sallard
hall records. Some good
Some indifferent.

Ans set up #6 camera,
exposed with regular lighting.

① f4.5 - good to little over exposed.

② f6.3 - good exposure.

③ f9 - Underexposed.

Focus seems to be good.

Also Portrait picture of Bobb
lit with 3" Daalmeys lens.

① - 14ft. lit turning head f5.

② - 11" " " " f6.3

Sent films to Reulised to develop.

8/27/44.
all crew off.

AMK made tests of new cheap
tels.

3 tapes at f. l. 5.6-8 showed
the best for this class of work
give sharp contrast & not
half tones are what is desired

Set taken for Reduced to Developer
x New-Char Edition.

Experimented on electrolysis of
fixing solution.

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Kinetophone and Kinetoscope Experiments -- Miscellaneous Books
[not selected]**

These seven books were used by William W. Dinwiddie, Harry W. Doyle, Zachariah P. Halpin, and James W. Ramsay during 1911-1914. Included are experiments to ascertain the best carbon element for the "motion picture machine." There are also tests to determine the optimum relative positions of the kinetoscope and phonograph for synchronization. Some entries describe tests of the home projecting kinetoscope, including lighting, safety, and parts. There are also tests of various screens and films, as well as experiments with film developing machinery and formulas. One book (N-14-01-27.2) contains drawings of parts for a motion picture camera. The notes indicate that Adolph F. Gall, Charles W. Luhr, J. O. Lyman, Elroy Pearsall, and an employee named Rowlands were doing similar work.

N-Number

Labels and Inscriptions on Front Cover

Books Not Selected

11-08-31	---
12-10-02.2	"Dinwiddie Ramsay Developing etc. Silver Plating. Celluloid."; "Disc Records"
13-01-28	---
13-03-15	"Automatic Film Developing Machine. W. W. Dinwiddie. March 15, 1913. S.O. 3300"
14-01-09	"Miscellaneous Tests"
14-01-27.1	"Drying Machine"
14-01-27.2	"Experimental Recording. HW Doyle"

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Group 3: Navy and Wartime Research Experiments (1917-1919)**

These thirty-one notebooks were used during the period 1917-1919 for experimental work for the U.S. Navy and other wartime research. The experimenters whose research is documented in these books include Jerry T. Chesler, Charles T. Dally, E. Rowland Dawson, William Deans, John A. Hanley, Newman H. Holland, William A. Hayes, Absalom M. Kennedy, Paul D. Payne, Edwin Smith, Jr., and Selden G. Warner. Many of the books contain entries pertaining to submarine and torpedo detection. Also included are experiments on smoke generation to hide ships, the prevention of rust on submarine guns, and improvements to range finders and spotting telescopes. In addition, there are notes on a respirator to protect men in the fighting tops of battleships from sulphur dioxide fumes, a smoke bomb, a kite for bomb delivery, a primary battery for airplane use, a "stabilized plane for running light," and a "wheel" weapon for trench warfare. Much of this work was carried out under Edison's instructions and supervision. Some of the tests took place at sea near Sandy Hook and Red Bank, New Jersey. Sixteen books with indications of oversight or involvement by Edison have been selected. Related material can be found in the Naval Consulting Board and Related Wartime Research Papers, Special Collections Series.

The notebooks are arranged in five subgroups:

1. A. M. Kennedy Books, Nos. 1-7 (7 notebooks)
2. J. A. Hanley Books, Nos. 1-2 (2 notebooks)
3. Submarine Detection Books (4 notebooks)
4. Miscellaneous Books (13 notebooks)
5. S. G. Warner Books (5 notebooks) [not selected]

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments
A. M. Kennedy Books, Nos. 1-7**

These seven notebooks were used by Absalom M. Kennedy during March-November 1917 for notes on experiments with submarine and torpedo detection, underwater acoustics, transmitters, receivers, amplifiers, audion circuits, and submarine illumination. Several books include notations by Edison as well as Kennedy's remarks about Edison's opinions and suggestions. The notes indicate that James M. Burns, Jerry T. Chesler, E. Rowland Dawson, John A. Hanley, Joe Melner, and Sherwood T. (Sam) Moore also worked on experiments with Kennedy. Some of the tests took place at sea near Sandy Hook and Red Bank, New Jersey. Related notes by Kennedy can be found in the Naval Consulting Board and Related Wartime Research Papers, Special Collections Series.

<u>Book #</u>	<u>N-Number</u>	<u>Labels and Inscriptions on Front Cover</u>
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Selected Books

[1]	Undated.6	"Description of Transmitters and Receivers. (Kennedy)"
2	17-03-06	"Experiments. #2 March 6 - March 20"
3	17-04-05	"Experiments #3 March 21-"
4	17-04-01	"Experiments. #4 from May 1 to 1917"
5	17-08-27	"Experiments #5. From 8/27/17 to 10/9/17"
6	17-10-04.1	"Experiments #6 From Oct. 4 to Nov. 2, 1917"

Books Not Selected

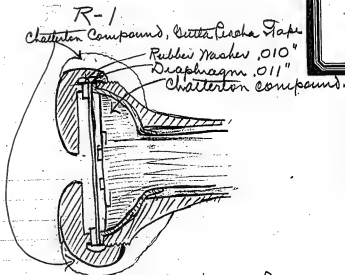
7	17-11-02	"Experiments #7 From Nov. 2, to 1917"
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**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments -- A. M. Kennedy Books
Notebook, N-Undated.6**

This undated notebook was used by Absalom M. Kennedy and another experimenter in March 1917 for notes on work for the U.S. Navy performed under the direction of Edison during World War I. At the beginning of the book are entries by an unidentified experimenter probably relating to submarine illumination. The notes and drawings by Kennedy pertain to three experimental transmitters and three experimental receivers. The front cover is labeled "Description of Transmitters and Receivers (Kennedy)." The pages are unnumbered; 17 pages have been used. Only the entries by Kennedy have been selected.

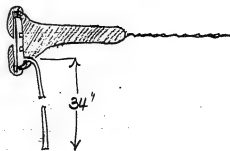
Receivers

R-1



Regular Beel Receiver. Interior
 filled with Chatterton Compound.
Diaphragm - Regular Beel,
 .011" x 2 3/16" .015" from magnets
Rubber gasket .010" thick between
 cap shoulder and diaphragm.
 Joint between cap and body
 covered with Chatterton
 Compound and wrapped with
 Gutta Percha and Tape to
 prevent leakage.

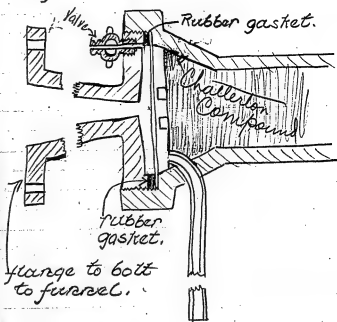
R-2



Same as R-1 but with brass
tube $\frac{1}{4}$ " diameter, 34" long
connecting inner air chamber
to equalize pressure.

R-3.

Brass Receiver for use with
fuzevel.



Electrical and Magnetic construction
same as #1.

Valve as shown to draw all air
from outer chamber.

Valve as shown to equalize
pressure by compressing air in
inner chamber.

Transmitters

1

Large Blue

Pulse Eb

240 instructions per second

#2

Small Bell

Pitch B

488 vibrations per second.

#3.

Break wheel and reamer.

Break wheel turned by
hand. Has 92 teeth.

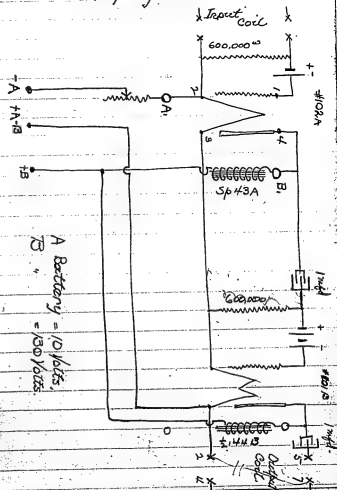
Reamer, from Stromberg-Carlson
Ideal Set, Hatch Case type -
.010" diaphragm.

Use as standard 2 cells M8
Storage battery.

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments -- A. M. Kennedy Books
Notebook, N-17-03-06**

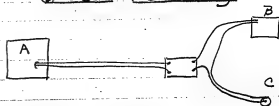
This notebook was used by Absalom M. Kennedy in March 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The book, which has been used in both directions, consists primarily of notes on experiments involving amplifiers, audion circuits, transmitters, and transmitter parts. At the other end are a few pages containing descriptions and drawings of transmitters, numbered E1-E6 and E31. Several entries include notations by Edison or remarks by Kennedy about his opinions and suggestions. The notes indicate that E. Rowland Dawson and Joe Meilner also worked on these experiments. Two items, including a note in Edison's hand, have been inserted into the book. The front cover is labeled "Experiments. #2 March 6 - March 20." The pages are unnumbered. Approximately 110 pages have been used.

W.E. Co. Corrections for special amplifier.



A Battery = 100 Volts
B " = 100 Volts

Tests of Amplifier with break running.



A closed. No phone on.
B Has power on
C running

①
Straight circuit as above.
Chirups

②
Connected Reliability ground.
Stops Chirups. Dead Brake wheel 57

③
1 mfd condenser across 2-7 of
output coil.
Stops Chirups. Break wheel loud.
Sudden break at 2

④
Condenser across 2-4
Chirups

⑤

Condenser across 4-5
Continuous loud noise.

⑥

Condenser across 4-7
Continuous loud noise.

⑦

Condenser across 5-7
Chirruping - slow

⑧

Condenser across 2-5
Chirruping stopped. Noise very slight. 30

⑨

3500^W across 2-7
Chirruping stopped. Loud noise 60

⑩

3500^W across 2-6
Chirruping.

⑪

3500^W across 2-5
Loud noise

⑫

3500^W across 4-5
Chirruping.

⑬

Chirruping stopped. Loud noise.

3500⁰⁰ across 5-7. - Chirups. (14)

Since (8) was good compare with it. ✓ (1)

1 mfd condenser across 2-5
no chirups, slight noise 30

(2)
2 mfd across 2-5
Very slight noise but
intermittent, slowly, louder 20

(3)
6 mfd across 2-5
cuts out almost all noise but
slight intermittent 8

~~Then connected transformer
#9 across circuit between
audions.~~

~~Chirruping stopped~~

Then put #7 coil in place of #9 - high to audion, low to receiver.

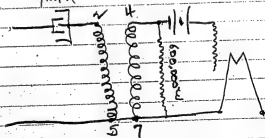
Regular circuit
Chirrup

Using Reibowitz ground
Steps chirrup.

1 mfd condenser across 2-7.
Steps chirrup. Some noise.

1 mfd condenser across 2-5
stops chattering, no noise.

Then put repeating
Coil #9 between audions
and



⑤
With #9 repeating coil as before
stops chirruping but the
break noise is very prominent

Then put ⑥ on Ruhovitz ground
Large part of the break noise is
cut off measures 50

⑦
Removed ground and put
1 mfd condenser around 2-7
of output coil
Break noise less 30

⑧
Then reversed connections
H and T. No ground or condenser.
Noisy - very like ⑤

⑨
Then put on Ruhovitz ground.
Still noisy.

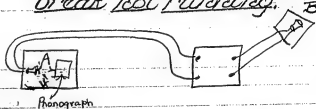
⑩
1 mfd condenser 2-7.
Noise much reduced 30

⑪
Removed condenser. Noise. Then
connected neutral points of the
primary & secondary of out put

coil together. Same noise

(12)
Then connected up as in 7
(mpf condenser across 2-7), and
started the vibrating spring with
magneto connected in A circuit.
Can hear the oscillations
but they are very faint, not
as good as without the
audion.

Tests for amplification,
break pot running. B



A - receiver on, H from phone in box.
B - receiver hand in booth.

(1)
Straight circuit as (5) - with
repeating coil between audions
out but rebounds ground in
the vat

②
1 mfd condenser connected
from 2 + 7 of output coil
Heard at 60

③
Repeating coil between
audions as in ⑤,
now get high pitched
whistle.

④
Combining ② + ③
Heard at 60.

⑤
Repeating ② with 2 mfd
condenser. 60

These run to 60, the end of
the scale.

Set Phonograph 6' from
transmitter.

~~High 1 mfd condenser 2-7
Heard at 50~~

~~1/10 mfd condenser at
(more noise) 46~~

②
~~With 2 mfd condensers
hear at
(phono) much not so loud~~

52

These run to 60 - end of scale
20 mfd phono graph & from
transmitter to reduce figure 1.

③
With 1 mfd 2-7, output coil 60

Moved receiver to 8' from
phono graph
Still hear at 60

Put Minors Lamp Case &
battery in front of transmitter
at 8" (Phono graph) 54

⑦
Used 10 mfd condenser 54

⑧
Used 7 mfd condenser 54

⑨
Used 6 mfd condenser 58

Mr. Edison said that the trouble was really leakage in the output coils.

Had 2 Bunnett coils used in place of W. E.

These cut out the chirruping and a great deal of the dynamo noise. Showed 36 where W. E. showed 50.

Speed these on break wheel. Very loud noise.

Then grounded both sides of primary thru about 3000 resistance, just as loud.

Both sides of secondary through same resistance. no difference.

Both sides of primary through 2 mfd. condensers. no sound.

Mr. E. then states that trouble was in the insulation between primary and secondary coils and that the a.c. was leaking from the one to the other and that new coils

would have to be tried,

Experiments on Amplifier

- ① Connected 2 mfd. condensers around break.
Killed noise of break entirely.
- ② Started up vibrator on septem.
Could not hear vibrator.
- ③ Cut input coil out and connected direct to amplifier.
No better results.
- ④ Used telephone receiver as transmitter.
Most perfect telephone conversation I ever heard through the break.
- ⑤ Then cut off the break.
No change in conversation.
- ⑥ Then took out feet coil out so as to talk directly thru amplifier.
Conversation a little weaker.
- ⑦ Then connected vibrator in this circuit.

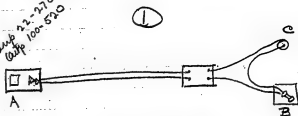
- Could not detect vibrations
- ⑧ Then connected break in primary circuits.
Could not hear.
 - ⑨ Then put 10 mfd. condenser in shunt with break.
Can hear break and little of vibration
 - ⑩ Then connected the break so that it was back in the primary circuits. No better.
 - ⑪ Then connected in Bunnell coils as input & output. All singing & chattering stopped.

After a number of trials with and without break, found that the trouble we have been experiencing was because of a super sensitive input coil - not trouble with output and that when this coil was removed, dynamo noises, singing & chattering etc. were also removed, though the amplification may not be as loud.

8/7/17.

Reconnected W192 (Large Input) coil
so as to give 2165 - 4387 connections.
On connecting up, this gave a
very high pitched note with
telephone in circuit at A.

Dep 22-270
Dep 100-520



- A - closed, phone on line
- B - closed
- C - running.

Input Coil P22-5270 Bunneel
Primary to A - secondary to audion
Output Coil P100-5520 Bunneel
Primary to B - secondary to audion

Break wires lead
Steel near at

60-
60.
W4

②
Stopped C on contact. Phone
running at in box. Transmitter
8' from box behind miners lamp
case & battery.
Tides at
Line angularly noiseless 42

③
Put 1/10 mfd condenser around
break
Break noise very slight.
Cut out at 24

④
Put 1 mfd condenser around
break.
Very little noise from break
Cut out at 20

⑤
Mr. Edison took cloth insulation
around primary of output coil.
Removed cloth around input
coil. With no condensers around
break.
Nearly all noise removed - cut out at 24.

⑥
Input coil then covered with original cloth.
Noise louder. Cuts out at 56

⑦
Then cut out the telephone and short circuited A.
Noise practically cut out.

Input coil has cloth —
output coil cloth off acc insulation

⑧
Put resistor on A. Phonograph in box, removed 8 of distance and behind miners lamp battery.
Stopped break on contact.

Box reading 42

⑨
Then took cloth off input coil, testing as in ⑧
Box reading 42

⑩
Replaced input coil (Bumme)
with N. E. 11.192. Short circuited
ling at A.
Got churning.

Then put ⑪ Lebowitz ground.
Chirruping stopped.

Resistance of Coils used.

Input N.E. MIGR { Primary ^{1.304} 1.30 ohms.
Secondary 1760, "
1758 "

Burrell Coils.

Primaries:

- ① + 11 ohms
- ② 22 " ✓ not N^o 1
- ③ + 100 "
- ④ 260 "

Secondaries:

- ① 130 ohms
- ② 270 "
- ③ + 520 "
- ④ 1000 " N^o 1
- ⑤ + 2800 "

130
270
520
1000
2800

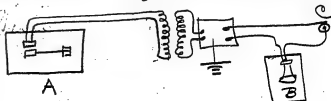
(12)
Connected Bunnell coil
11-2800 in circuit as
of input coil. Break
running, A closed.
Chirrup badly.

(13)
Then put on Relativity ground.
Chirrup disappears.
Slight brake noise cut out at 16

(14)
Stopped Break on contact
connected transmitter at A
& started phonograph
Heav to 48.

9/7/17 - night

Detection of Vibrator.



Tests made by connecting magnet of vibrator to line at A. This goes to 11-2800 Sunnell coil and to audion board. Through 520-100 Sunnell coil to break C (running) in series with piece of B. Had Dawson start vibrator & count for 15 seconds. I must repeat count to insure correctness. Below is ground on-

Small Vibrator - Fast, Can not hear at all

②

Cut out Sunnell coil 11-2800 connecting A direct to audion. Hear slightly but could not count.

③
To make sure circuit was
complete, put transmitter on
A and had Dawson talk.
Could hear him, jumbled of
course through break.

④
Took off Reichenitz ground,
leaving dialator direct
to Dawson board.
Circuit noiseless.
Can not hear anything.

⑤
Put Binneel coil 11-2800
back in circuit, - no ground -
can hear break.
I got 65 Dawson 58 feet high
" " 59 " 57 second "
" " 56 " 60 third "
This is the first time I have
been able to detect.

⑥
 Then connected $1/10$ mfd
 condensers around break.
 Noise of break wheel much
 reduced.
 1st trial Dawson 53 Kennedy 54
 2nd " " 54 " 53
 3rd " " 55 " 57
 For these, I really hear only
 the 1st 12 or 15 beats and
 continue the count on
 the rest to 15 sec.

⑦
 Then had Dawson make
 the vibrator slower, so that
 I could not remember the
 speed of beats.
 1st trial Dawson 36 - Kennedy 41.
 2nd " " 37 - " 38.
 3rd " " 38 " 37.

I do not believe however
 that a person without
 a keen sense of musical
 rhythm would be able
 to do this.

⑧

Dawson then moved the magnet back so that it was close to the spring rather than the weight of the vibrator.

①	Dawson	38 - Kennedy	40
②	"	32 "	36
③	"	32 "	31
④	"	34 "	35

* speed changed here.

In all of the above the spring hit or touched the magnet faces so as to give a distinct sound.

Then tried to vibrate so that the spring would not hit the magnet. I was not able to count such because I could not get the rhythm of the first beats.

④ Then connected through direct from A to B & C without amplifier. 1/10 mfd condenser still on break

① Dawson	31-	Kennedy	31.
② "	31-	"	33.
③ "	31-	"	31.

Dawson moved weight.

① Dawson 42-Kennedy 43.

Dawson moved weight

① Dawson 28-Kennedy 28.

Dawson moved weight

① Dawson 35-Kennedy 36.

In no case above did the spring touch the magnets, I can hear each beat perfectly so that this is much more sensitive than with the audion.

Then removed condensers
from wreck wheel.

① Kennedy	44 -	Dawson	39 -
② "	41 -	"	41 -
③ "	37 -	"	37 -

While I got the above, I
made some false takes and
could not hear as well as
before.

Then put 7 mfd. condensers around
wreck.

① Dawson	34 -	Kennedy	36
② "	46 -	"	46
③ "	39	"	39

Reduced amplitude

① Dawson	32 -	Kennedy	32
② "	46 -	"	46
③ "	40 -	"	43

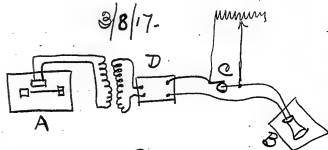
Results not as reliable as at
10 mfd.

110. nif condenser. at break
 as standard.
 + changed to large vibrator.
 ① Densen 45 - Kennedy 46
 ② Wm. 45 - " 45
 ③ Dens 47 - " 47
 ④ Dens 52 - " 52

then connected in circuit
 with Bunnell coil 11-2800
 and audion. no ground
 Dawson 43 - Kennedy 43
 " 49 - " 48
 " 48 - " 48
 " 54 - " 51
 " 52 - " 52

Vibrations

3/8/17.



①
Used Range vibrator at A,
audion with 11-2800 Bunnell
coil at D -
C stopped on contact
B closed.

Experiment to see if we could
hear A with C not running.

Can not hear when vibrator
works normally. Can hear
when the spring touches the
magnet.

②
Then started C, shunting
with various resistances to
keep down noise -
① Infinite Resistance. Can hear
only when spring touches magnet.

- ② 1000 ohms around C.
Still hear break. Can not
hear the vibrator.
- ③ 500 ohms around C.
Still hear break. More musical
sound. Can not hear vibrator.
- ④ 200 ohms around C.
Still hear break. Loud as ever.
Can not hear vibrator.
- ⑤ 100 ohms around C.
Still hear break as loud as ever.
Can not hear vibrator.
- ⑥ 50 ohms around break.
Get dynamo noise much more
prominent. Break noise still.
Can not hear vibrator.
- ⑦ 20 ohms around C.
Get dynamo noise & break
Can not hear vibrator.
- ⑧ 10 ohms around C.
Dynamo and break noise
Can not hear vibrator.
- ⑨ 4 ohms around C.
Dynamo and break noise
Can not hear vibrator.
- ⑩ Stopped break wheel.
Hear dynamo noise.

- ✓
- ⑩ 2 ohms around C.
Dynamo noise, Break noise
very slight.
Can not hear valuator.
- ⑪ 1 ohm around C.
Dynamo noise. Break noise
slight.
Can not hear valuator.
- ⑫ Short circuit C.
Dynamo noise. Very slight
break noise.
Can not hear valuator.

Test of Test Box for transmitter.

Mr. Edison had box 8' long
12" x 12" section made to keep
external sounds out of
transmitter which is enclosed
in another box 6" x 6" x 8"
with hole in front opposite
diaphragm.

With diaphragm on this
open hear to 48

Test of Diaphragm of Transmitter Box.

Wide open (transmitting)

3/4

1/2

1/4

0

Closed

44

44

44

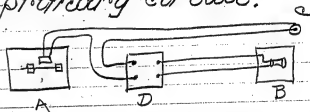
44

44

44

This means that the small box
must be made more nearly
sound tight.

Test of Vibrator in primary circuit.



A = Vibrator connected

B = Closed

C = Running

D = With 11-2800 Bunzel coil
as input and 520-100 Bunzel

coil as output.

①

Valuation moving very slightly.
Magnets $\frac{3}{16}$ " from Reed
Dawson 31 - Kennedy 31 Valuations:
" 36 - " 35 "
" 40 " 40 "

②

$\frac{1}{10}$ mfd condenses around break.
Dawson 38 - Kennedy 37 - Valuations:
" 30 - " 32 "
" 31 " 32 "

(Magnets $\frac{9}{16}$ " from Reed)

③

Magnets $\frac{1}{4}$ " from reed.
Dawson 29 - Kennedy 30 valuation

④

Magnets $\frac{5}{8}$ " from reed.
Dawson 30 - Kennedy 37 valuations.

⑤

Magnets $\frac{1}{2}$ " from reed.
Dawson 30 - Kennedy 29 Valuations

⑥

Magnets $\frac{1}{2}$ " from reed
Dawson 34 - Kennedy 33 valuation

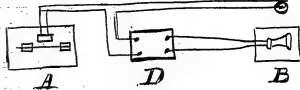
$$\begin{array}{r} 60/9420 \\ 157 \end{array}$$

$$\begin{array}{r} 60/11100 \\ 185 \end{array}$$

(7)

Mr. Edison then directed to try
and hear fan blades going
slowly.
Could not hear this.

Test of Break Wheel
at various speeds. ^C



A closed, vibrating $\frac{1}{2}$ " from magnets
B " with reed switch.
C running at following
speeds in breaks per second.

C = 157 breaks per second
Dawson 29 Kennedy 31 vibrations
Can just hear. ⁽²⁾

C = 185 breaks per second.
Dawson 31 Kennedy 30 vibrations
Can just hear. no improvement

$$62 \overline{) 17472}$$

$$6 \overline{) 452}$$

③
C = 708 breaks per second
Dawson 37 - Kennedy 32 valuations
No improvement

④
C = 247 breaks per second
Dawson 31 - Kennedy 33 valuations
No improvement.
Break jumps and is irregular
at this speed.

⑤
Then adjusted spring of break
so as not to jump so much
C = 247 breaks per second.
Dawson 32 - Kennedy 32 valuations

⑥
Then adjusted spring a little
tighter. Same clear
C = 242 breaks per second
Dawson 31 - Kennedy 31 valuations

⑦
Experiments at lower
speed.

C = 150 valuations per second.
Dawson 35 - Kennedy 35 valuations

$$\begin{array}{r} 6780 \\ 130 \end{array}$$

$$\begin{array}{r} 92 \\ 78 \\ \hline 1400 \end{array}$$

$$\begin{array}{r} 6780 \\ 130 \end{array}$$

⑧

C = 130 valuations per second.
Dawson 34 - Kennedy 36 valuations.
Think I hear better at this speed.

⑨

C = 90 valuations per second.
Dawson 34 - Kennedy 35 valuations.
Then tried valuating at lower
amplitude -
Dawson 34 - Kennedy 35 valuations.
Seems better at this speed.

⑩

C = 55 valuations per second.
Dawson 33 - Kennedy 30 valuations.
Not so good. Could not get
lower amplitude.

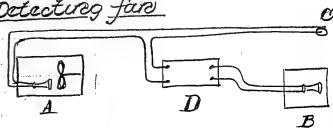
⑪

C = 33 valuations per second.
Dawson 35 - Kennedy 35 valuations.
Tried lower amplitude.
Dawson 34 - Kennedy 35
but not very plain.

$$\begin{array}{r}
 392 \\
 \underline{784} \quad 3 \\
 4 \\
 60 \overline{) 3136} \\
 \underline{57}
 \end{array}$$

3/9/17.

Detecting fan



A = closed, with transmitter.

B = receiver.

C = running, normal speed 150 beats per sec.

D = with Bunell 11-2800, 520-100 coils.

(1)

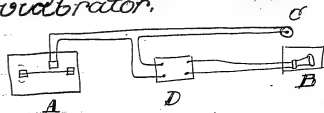
Lowest speed at which I could detect fan running was 784 r.p.m.

As there are 2 blades to fan, this means 3136 impulses per minute or 52 per second.

I do not believe this speed is necessary because of the number of impulses per second but because it requires this speed to produce breeze enough to hear.

Test of Calibrating Box.
and of new coil.

Test of distance of magnets from large vibrator.



A = closed with vibrator magnet
B = " " reverb.
C = running about 90 breaks per sec.
D = has Bunnell 11-2800, 620-100 coils.
Setting of spring of A = 18'.

① Magnet $\frac{3}{16}$ " from spring
Dawson 40, Kennedy 4 1/2 vibrator
Load & clear

② Magnet $\frac{7}{16}$ " from spring
Dawson 40 - Kennedy 3 1/2 vibrator
Load & Clear

③ Magnet $\frac{1}{2}$ " from spring
Dawson 41 - Kennedy 2 1/2 vibrator
Load and clear -

(4)
Magnet $5\frac{1}{8}$ " from spring
Dawson 47 - Kennedy 47 - evaluation
Not very loud but clear.

(5)
Magnet $3\frac{1}{4}$ " from spring
Dawson 41 - Kennedy 47 - evaluation
Still clear.

(6)
Magnet $7\frac{1}{8}$ " from spring.
Dawson 47 - Kennedy 43 - evaluation
Hard to get & distinguish.

(7)
Magnet 1" from spring
Can not distinguish

(8)
Then moved magnet opposite
might to see if this would be
more efficient.

Magnet 1" from weight.
Dawson 47 - Kennedy 47 - evaluation
Loud and clear here.

(9)
Magnet 11" from weight.
Dawson 40 - Kennedy 40 - evaluation
Loud & clear.

Deduction

The limit of hearing
comes suddenly.

Space between poles of
magnet = $\frac{3}{8}$ "



At ordinary
distances some
of the lines can
reach the
inducting
weight



At greater
distance however
they have no
tendency to
jump the distance
in space

Magnet $1\frac{1}{8}$ " from weight.
Dawson 42 - Kennedy 43 sensations
quite clear.

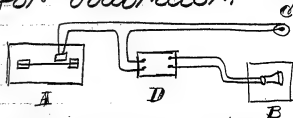
Magnet $1\frac{3}{8}$ " from weight.
Dawson 41 - Kennedy 40 sensation
very faint; Do not believe I can
hear further.

Magnet $1\frac{1}{2}$ " from weight.
Can not distinguish.

62/64
21

62/64
188

Experiment to find
most efficient speed
for vibrator.



A = closed with magnet $\frac{7}{8}$ " from spring
of vibrator.

B = closed with pressure.

C = running at about 90 breaks
per second.

D = used with Bunnell 11-2800, 520-10
coils.

Large Oscillator used.

(1)

With weight at end of neg.

Dawson 47 - Kennedy 41 - Oscillations

(2/3)

(2/3)

Very faint. Can just hear.

(2)

Weight moved $4\frac{3}{8}$ " from end

Dawson 47 - Kennedy 47 - Oscillation

Some triple burden.

~~6/10 3/4~~

~~6/10 2/7~~

~~6/20 3/5~~

~~6/21 2/5~~

Suggest for sensitiveness

Carbon contact between the weight and reed so as to vary contact & current as the weight swings.



spring (reed)
hard rubber.
Carbon.
Weight.

③

Height $7\frac{1}{4}$ " from end.

Dawson 48 (3.7) Kennedy 47
Sew to hear a little better.

④

Height $10\frac{1}{2}$ " from end.
Dawson 53 (3.5) Kennedy 53
Sew to hear better.

⑤

Height $13\frac{1}{2}$ " from end.
Dawson 57 Kennedy 55.
Hear fairly.

⑥

Can not get switch weight off
as the spring will not vibrate
for 10 seconds

9/9/17

Test of EI Transmitters



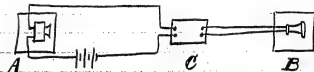
Distance & conditions

A = Phonograph in box
with $\frac{3}{4}$ " hole.
W. E. Cumling Reed
#1 used.

B = Microphone, mounted
on 2 lead blocks

with cord laid between.
Door between rooms closed.

Wiring Diagram.



A = transmitter, with 3 cells battery

B = receiver boxes.

C = Audion using Sunnell
coils 11-2800-1260-100 coils,
as input output

(1)

Set up and tested out. Could hear with door open. Could not hear with door closed.

(2)

Tapped & shook transmitter. Able to hear with door closed at times as far as 30 on bar.

(3)

Shook transmitter again and changed primary of input coil from 11 to 280.

Could not hear at all after considerable search found that transmitter was fitted in at 90° from correct position so that balls did not touch. On turning could just hear with door closed but transmission rough & coarse.

(4)

Reversed 11 primary. Freed tuning transmitter by "squealing" with receiver. Somewhat more sensitive can hear at 12 but coarse.

Deductions -

① It is evident that tuning the transmitter improves it wonderfully.

② That a high ratio of turns is needed in the input coil rather than a greater number of turns on primary but with less ratio.

⑤ Disassembled transmitter. Found diaphragm in good shape, every ball in place.

Set up. Could not hear with door closed.

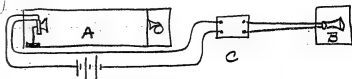
⑥ Tuned again by squealing with receiver. 11 primary used.

Worked fine. Heard to 60 with door closed.

⑦ Changed input coil to 280 primary. Could not hear as well as with 11 coil. Only $\times 38$.

9/10/17.

Test of E-3 Transmitter



A = E-3 microphone in long box, 7'-3"
from phonograph in box with
4 1/2" hole, 3 cells battery used.

B = Closed with pecuena & boxes.

C = audion Sumner 11-2800; 260-100 cells

(1)

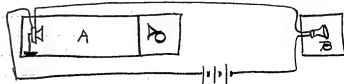
E-3 at 0°
Could hear to 60

(2)

E-3 at 15°
Could hear to 60.

Mr. Edison consented to
make preliminary test
without amplifier.

Test of E-3 Transmitter



A = E-3 microphone in long box
7'-3" from phonograph in box
with 3/4" hole. 3 cells battery
used

B = closed. Reverses boxes

E-3 at 0°

1° at 5°

2° at 10°

3° at 15°

4° at 20°

5° at 25°

6° at 30°

7° at 35°

8° at 40°

9° at 45°

10° at 50°

11° at 60°

12° at 70°

(1)

Transmitter quiet
natural

coming going
down up

40	32
46	26
48	46
46	40
50	40
52	54
54	54
50	50
50	48
52	50
52	50
52	52

Measuring Substructure
Capacity

E-4 receiver is bad in
design in that



Diaphragm

- ① Receiver to be activated by
attaching carbon to diaphragm,
by means of nut.
- ② This carbon is liable to
wobble because of this
support.
- ③ Liable to touch back carbon
because of brass clamping
ring.

Test of E-4 Transmitter

Under same conditions as E-3
down up

E-4 at 0°

" " 10°
" " 15°
" " 20°
" " 25°
" " 30°
" " 35°
" " 40°
" " 45°
" " 60°
" " 90°

Transmitter quality
fair, below, metallic
unnatural

38	42
32	40
42	40
36	36
34	32
32	24
34	26
24	38
24	38
28	34
28	26
20	30

3/10/17

Test of E-3 against E-1.

✓ Set up E-1 as last night.
With door closed can hear to 38

E-3 with door open hear to 18

3/11/17

Test of E-4 against E-1

Set up E-1 as last night. With
door closed can hear to 52

E-4, inclined 15° door open hear to 40

" " 15° " closed " " 18

Quality short. Not as good as E-1

Test of E-4 with only 12
rows of poles loaded
with balls.

Door open hear to

36

Door closed hear to

14

Mr. Edison states this should be more
sensitive than above & trouble is with
the balls.

Found that the balls packed
in the holes due to

- ① Out of round
- ② Broken balls & chips.

Mr. E. had Melner make
gauge to check only
balls of proper diameter.

Previous coiling on glass
shoes have eliminated the
out of rounds.

Mr. Edison had Melner make
up gauge for balls.

Test of E-4 with tested balls

Test of E-5 against E-1

E-1 can hear to, down closed 58
E-5.

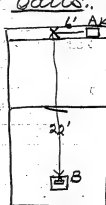
at times can hear clearly
to 60 then falls off to nothing
very irregular. Improved
by turning but does not hold.

Could only hear by closing
the opposite opening. With
both open could not hear
anything.

On opening up, found only one
row of blades in place and this
one packed.

This is an awful transmitter
to assemble. The diaphragm is
not fixed but loose between the
two back electrodes. The adjustment
will be 99% guess, if possible
at all.

Tests of Transmitters filled with selected balls.

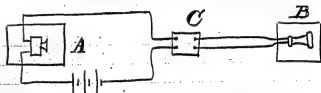


Distance and
conditions

A = phonograph in box
with $\frac{1}{4}$ " hole. The
counting record
#1 used.

B = microphone
mounted on 2 lead
blocks, with
corkain between.

Wiring Diagram.



A = transmitter with 3 cells battery

B = receiver and horns

C = Audion using Bunuel coils
11-2500 input 250-100 output

① Transmitter E-1.

Door open hear to
Door closed " "

60
54

② Transmitter E-3 inclined 15°

(Could not get it to equal with receiver)
Quality not as good when Dawson talks and
Readjusted so as to equal with
receiver.

Could not hear with door open
loaded - 12 rows.

③ Transmitter E-4 inclined 15°

Door open to
Door closed to

28
5

Very noisy. Grip & rings.

④ Special Magna-
Transmitter E-6

at 5' from photographs.

Can hear to
Standard Bell Receiver

8.
46

⑤ Transmitter E-4 as in ③

But with rubber on each
side of diaphragm.
Door open hear at
Door closed " "

30
6

⑥ Same as ⑤ except that
only 3 balls in each of
12 holes.
Door open hear to 22

3/13/17

Test of E-4 receiver with
"002" freq. in place of
copper diaphragm. 15°

1. Remounted E-1

With door open could hear
only to 22

Readjusted by singing -

With door open can hear to 60

With door closed " " " 44

Then tuned up E-4 so that it
rings.

So noisy that I can not hear
them inclined to 30°.

With door open hear to 60

With door closed, so noisy
I can not hear phonograph
but can hear Devereux's records
easily.

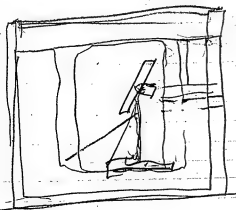
Then changed E-4 to 45
above noise can just pick up
phonograph at 12

Comparisons of Noise -

Laboratory	100%
Eagle Rock Casino, Back Room	60%
" " " Front "	40%
" " " Interior Hall	20%
Cellar, "Hulohison House	10%
Columbia St. Studio	25%
Cellar, Mt. Pleasant Ave	3%
Cellar, Mr. Edison's (Basin)	8%

Test of E-4 with rubber
stopper vs opening.

Putting rubber stopper in
opening of E-4 diminishes
noise slightly but does not
remove. Reduces noise
more than 20%.



Distance I can hear watch.

In Laboratory (day)	about 30"
Columbia St. Club's Reception Rm	63"
" " " Reading Rm	72"
" " " Book	90"

Test of E-4 Transmitter in padded box

Transmitter fueled at 150
Put in box padded with
cow hair. Rebuilt stopper
in opening.

Car still hear steady
roar. This is continuous
and with but little variation.
Is non periodic and does
not contain high pitched
notes noticed this morning.

Can not hear phonograph
then took rebuilt stopper
out.

Noise practically the same
as with stopper in.

With door open can hear 33

With door closed

30

Dawson then padded around transmitter to prevent any vibration on stand. Also added weights on base. Cowhairs were around transmitter to stop any vibration.

No stopper in opening.
Still get roaring steady.

Door Open, Hear to

60

Door closed

34

Then had stopper put in opening. This caused considerable tapping, crying and some musical notes which died away. Noise

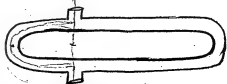
Same or worse

Can not hear phonograph.

With microphone in box and opening closed with stopper, on packing several inches from the box opening, the voice is reproduced very loud in back.

This proves that the microphone
is very, very sensitive, so much
so that it must be well insulated
and closed off from vibration
and sound to be able to reproduce
at all.

Test of Interference Tube.

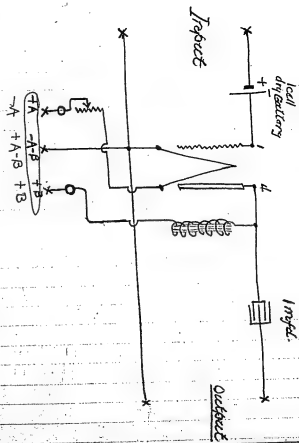


Length ~~short path~~
Outside 3', Inside 2'-6", mean 2'-9"

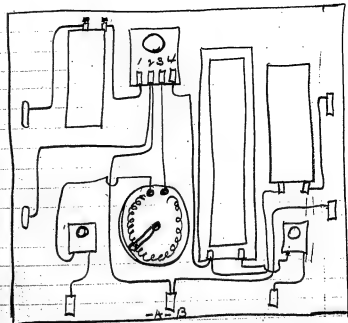
~~Long path~~
Outside 5'-6", Inside 5'-0", mean 5'-3"

Preliminary test A-435 piana loud
C=517-1 week

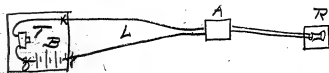
Wiring Diagram of N.E. 1 stage amplifier.



Assembly of N.F.
1 stage amplifier.

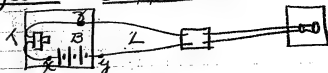


Test of Transmitter E-1, line and amplifier for noise.



- | | |
|---|----|
| ① As shown, 3 cells battery on T | 52 |
| ② As shown, 2 cells battery on T | 44 |
| ③ As shown, 1 cell battery on T | 34 |
| ④ Battery disconnected, y & z short circuited | 28 |
| ⑤ ^{same} Battery disconnected, x & y short circuited | 16 |
| ⑥ Line L loose from A. Only amplifier & receiver in circuit | 12 |
| ⑦ Repeating ④ to contrast with next experiment | 32 |
| ⑧ As T lmts x & y open | 28 |
| ⑨ Repeating ⑤ | 16 |
| ⑩ Same as ⑨ but with x-y open | 32 |

Test of Transmitter E-1,
tire and amplifier for
noise after B battery
has been insulated on
glass - stopper in I



- | | |
|---|----|
| ① As above, 3 cells on T | 52 |
| ② " " " " " T | 44 |
| ③ " " " " " T | 40 |
| ④ Battery out, x, y connected together
(noise changes to dynamo note) | 24 |
| ⑤ Same as 4 except x, y open | 28 |
| ⑥ Dynamo note still the most prominent
T cut out also, x, y connected together | 14 |
| ⑦ Same as 6 except y, z open | 30 |
| ⑧ Then disconnected talking
telephone both ends &
back to open | 50 |

WE now pull out primary of input coil 16
 Entirely Dynamo

⑨ Bell receiver, substituted for
T₁ and 3 cells of battery on
line L.

Noise 80% dynamo
70% roar

Cuts out at

28

⑩ Then put T with rubber
stopper in opening in place
of Bell receiver, but 3
cells of battery on line
L

Noise = 20% dynamo
80% roar

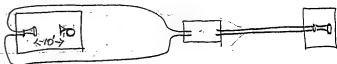
Cuts out at

56

Dynamo is of course weakened
by big resistance of Microphone -

Therefore there is a roar from
Micro - Street Car going past
roar increases 50% showing
Micro is jarred & this
produces roar -

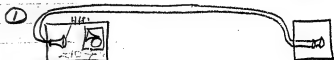
Preliminary comparison
of regular telephone
and of amplification
by 1 and 2 audion
bulbs.



- ① With two stage audion.
Reel received as transmitter, 10' from
open phonograph, NC Country
reel #1 used.
Can hear to 60
- ② With 1 stage audion,
without input or output
coils 14
- ③ Audion out out telephone
straight through to work 30

These results do not seem
right - that the two stage audion
only amplifies to twice as much
as straight through and one stage 1/2

Comparison of Audions with straight circuit.



- ① Reel receiver 4' from phonograph
in box playing W.E. Co. counting
record #1.
dear to 12. 12
No noise

- ② 1 stage audion in circuit
with Bunnett 11-2800 input
and 520-100 output coils, 8
(no noise)

- ③ 2 stage audion in circuit
with Bunnett 11-2800 input
and 520-100 output coils
slight noise, mostly
dynamo hum
Read to

Measurement of resistance
change of E-1 transmitter
when current is flowing.

- 1 = 3200 ohms with bridge
1 cell battery, .5 milliamp. 1.4 volt
- 2 = 4000 ohms with bridge
1 cell battery .3 milliamp. 1.4 volt
- 3 = 2200 ohms with bridge
1 cell battery .6 milliamp. 1.4 volt.

This is too rough a test to
show what Mr. Edison wants,
whether the resistance of the
microphone changes when
current flows through it.

Then tried connecting 3750 ohms
in series with microphone
and measuring voltage around
each.



Showed 1.4 volts X-Z. .58 volts
X-Y. 12 yz.

$$1.37 \div 0.1337 = .0185$$

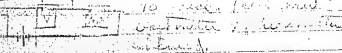
This shows that the resistance of the voltmeter is too low to measure such emfs.

Measured and found that the resistance of the 3 volt scale = 350 ohms.
Of the 150 ohm = 17,500 "

This means if used as a mill-ammeter:
On 3 volt scale, 1 volt = .00285 amp.
On 50 " " 1 " = .0005714 "

On my multi-scale
ammeter & voltmeter -
15 volt scale = 74.8 ohms
15 " " = 748. ohms
150 " " = 7480. "

1 Volt reading on 150 volt scale = 0.1337 amp
1 " " 15 " " = .001337
1 " " 150 " " = .0001337



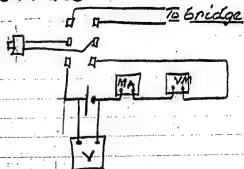
To check tried.



Oakmeter showed 1.37 on 1.5 scale
Millammeter .0185

$$1.37 \times .01837 = .0184169.$$

Measurement of Resistance
of E-1 without and with
current.



$$\begin{aligned} \text{Bridge} &= (1) \quad 1580 \text{ ohms} \\ \left\{ \begin{aligned} V.M. &= .2 \times .002857 = .0005714 \text{ amp.} \\ V &= 1.4 \text{ volts} \\ R &= 1.4 \div .0005714 = 2450 \text{ ohms} \end{aligned} \right. \end{aligned}$$

$$\begin{aligned} \text{Bridge} &= (2) \quad 4800 \text{ ohms} \\ \left\{ \begin{aligned} V.M. &= .03 \times .002857 = .00008571 \text{ amp.} \\ V &= 1.4 \\ R &= 1.4 \div .00008571 = 16,334 \text{ ohms} \end{aligned} \right. \end{aligned}$$

(3)

Resistance of M-1
Microphone.

① resistance with bridge

Current

4 mill amp.

1.32 V.M. Reading

Volts

1.4.

to 13.

12 ohms.

Test of M-1 Microphone.

Mr. E had Moore bring up his microphone for test.

With 1 cell - with audion as before, door open, could hear to 60.
With 1 cell - door closed, to 60.

Then put on musical record (for test). Quality very poor, jumbled and could only hear lower register but to 60.

Adjusted and put on more records. Improved quality but could not hear so far to 50.
Still muffled & only low.

Adjusted further. Improved quality ~~at expense of quantity~~ so as to hear only 44.

Then used 2 cells, hear at 50

Fair quality
Then used 3 cells.
Quality poor 44

Used 7 cells & readjusted
Quality better. 54.

On test next morning
heard with 7 cells
musical record at 54

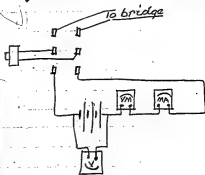
Same with M.E. talking
record 24
(not as much noise with M-1)

Test of E-4 mounted in
6"x6"x6" lead block - inclined
to 15°.

2 cells battery, door open	talking word	60
" " " " "	closed " "	48
" " " " "	" music "	56
3 " " " " "	" " "	60

more noisy than M-1 but
noise seems to be that carried
by the air around.

Measurement of Resistance
of E-4 is lead block.



①
Bridge showed 3700
 $IM = .09 \times .002857 = .00025686 \text{ amp.}$
 $MA = .1$
 $V = 1.4 \div .00025686 = 5444$
 $5444 - 350 = 5090 \text{ ohms}$
Jumped 1390 ohms with current

②
Bridge showed 5000
 $IM = .07 \times .002857 = .00019999$
 $V = 1.4 \div .00019999 = 7000$
 $7000 - 350 = 6650$
Jumped 1650 ohms with current
over

(3)

Bridge = 4000

$$M = .08 \times .002857 = .000228$$

$$V = 1.4 \div .000228 = 6087$$

$$6087 - 350 = 5737$$

Jumped 1737 ohms with current

(4)

Bridge = 2260

$$M = .14 \times .002857 = .00039996$$

$$V = 1.4 \div .004 = 3500$$

$$3500 - 350 = 3150$$

Jumped 890 ohms

Test of M-1 Microphone.

2 cells battery, musical record

door closed hear to

44

Type writer in next office

making so much fuss I can
not tell quality.Listening at 2-V, quality not
very good. However. Arguments
some notes diminishes others.Suggest that the steel carrying
carbon contacts on M-1 be eliminated
and these contacts be carried direct
on diaphragm to save weight.

Test of Tuned Reeds.

Tried to tune up new vibrator to old, heavy spring, wooden base one. Found it necessary to push weight back as far as possible or remove to make old one fast enough to synchronize with the new.

When tuned, the new one would quickly respond from 6' away.

Found that when its magnets were placed close in, the swing was damped. This may be a direct damping action due to the generation of induced current but I believe the natural period of vibration of the reed is changed by the change of amount of controlling force due to the addition of the force of the magnets.

Then, tuned up the small reed on cast iron base to heavy reed. Both now respond each time.

- ③ A = vibrating
B = responds (because turned)
D = humming
E = closed.

Within 4 seconds after
A is started can hear B very
plainly.

- ④ Repeat 3 but using
both magnets on B
connecting blue to blue
Can hear plainly, sharp
& clear.

- ⑤ Repeat 4 but connected
blue to purple terminal
Can hear but not as plainly
as before. Apparently blue
to blue connects magnets
in proper direction.

- ⑥ Connected magnets in parallel
blue to blue & purple to purple.
Can hear but not as well
as before.

⑦ Connected magnets in parallel, ~~blue~~ of one to purple of other. Better than ⑥. This is the right way for parallel connection. Series connection seems to give better effect than parallel.

⑧ Removed the old master vibrator to floor near bench and connected electrically to magnets of new vibrator after having first put similar magnets on master vibrator.

The second vibrator did not respond.

⑨ Tried experiments in response in various parts of my room. Found that second had ~~would~~ respond from any part of bench but not from any other part of room, proving that the motion was conveyed through shaking of bench.

Test of Magnetic
Transmitter E-6



Magnetic receiver 4' from
phonograph in box

Audion with Bunnett 11-2800
input and 520-100 output
coils.

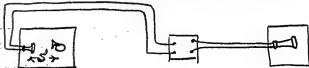
E-6 hear to
Quality poor - full, slow)

20

Bell telephone hear to

48

Test of special receiver
against standards.



- ① Connected up coils of receiver in series to get maximum effect.

This showed two interesting phenomena.

The sound is different from ordinary receiver or making contact with battery. In place of the sharp click there is a double sound as if it took the diaphragm an appreciable time to travel to the limit.

When current traverses magnets so as to assist them the sound is less loud than when it traverses the opposite direction. This is probably due to the

Small section near the
recoils. The permanent
magnet is so much larger
than this section that it
is normally saturated. An
increase in magnetic
strength due to the coils
adds but a few additional
lines through. A decrease
in strength due to opposed
coils however changes
the number of lines
greatly.

- ① Bell telephone as
transmitter, 5' from
phonograph in box
connected directly to
recoils

Could hear with Bell
recoils plainly. Could
not hear with special
recoils.

- ② They took phonograph
out of box and brought

transmitting receiver up
until could hear with
Special receiver, Transmitter
1 ft. from Rm.

I hear Special Receiver ^{connected in series} to	18
Bell " "	60
Special receiver connected in parallel to	10

Then tried to see if could
hear low frequency through
special receiver.

Connected large vibrator
with magnet.

Could not hear at low
or high frequency direct.

Then connected buzzer in
series

Can not hear with
vibrator still or going.

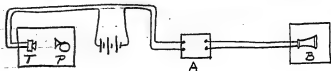
Then connected in auction
using special receiver.

Car not hear

Then put on Bell receiver.

Car hear very plainly

Test of Transmitter E-31.



- ① Set up usual way with 1 cell battery, phonograph in box, door open.
Could hear nothing.
- ② Then had Dawson shout in T.
Could just hear.
- ③ Then put bell telephone in place of T.
Could hear loud & clear.
- ④ measured resistance of T.
Found 37500 ohms by bridge
30,460 " " ammeter & voltmeter.
- ⑤ Then had Mulner take out all but 3 discs to diminish resistance.
Found open circuit due to broken

tin foil strip on diaphragm.

- ⑥ Then had strip renewed
Resistance with 3 discs 2200 ohms
by bridge 1531 ohms by ammeter,
ohmmeter method.
- ⑦ Then connected up in usual
method with 2 cells of
battery, door open.
Could not hear at all
- ⑧ Then had Dawson talk directly
in opening of T.
At first, blasted & broke - then
settled down and talked very loud
and very clear.
- ⑨ Then tried ⑦ over, with door
open.
Could not hear.
- ⑩ Then put rubber stopper
in opening of T. Door open
Could not hear.

⑪ Mr. E. had Meilner cut down the weight on the arm of T so as to give less pressure and to replace total number of 10 discs. Could not hear.

⑫ Had Dawson Tack direct in tube of T.
Could hear faintly but the transmission showed breaks - was choppy & broken.

⑬ Mr. E. had Meilner put carbon contact on weight so that contact would be carbon to carbon and not carbon to brass. Could not hear.

⑭ Had Dawson tack direct into T.
Could hear faintly. Sometimes with blasts. At times even palatable but very faint.

⑮ Found resistance as set up to be about 100,000 ohms.

Mr. E proved by putting weights on the carbon discs, that these must be separated by a molecular air space, hence the enormous resistance.

- (16) Mr. E then had Melroy roughen the discs, using 4 of them with 2 cells of battery.
- | | |
|----------------|----|
| With door open | 60 |
| " " closed | 40 |

(External noises especially loud this morning because of high wind rattling shacks & blundering and several people talking outside booth)

- (17) Mr. Edison then wanted us to test quality by reading from news paper & etc.
- With resistance in could hear about 40%

- (18) Put Rue Telephone in place of transmitter
- Door open to 4
Closed to 0

Shows that so called
dynamo noise was
really dynamo noise

(19) Mr. E had .003" steel diaphragm
put in Bell receiver as
transmitter. Electrode for
humming was cut off line
so "dynamo sound" stopped
Heard this to 14.

(20) ~~Mr. E had Melner make
diaphragm for Bell transmitter
of "meas. .003" with .003"
steel disc 1" diameter in
center.
Heard to 10
Dynamo noise gone. This
I do not understand.~~

(21) Mr. E had Melner make
special diaphragm for Bell
Receiver used as transmitter
X .002" mica



Door Open.

Paper ring in - not clamped
Heard to
(No dynamo sounds)

12

(21) Paper ring out, not clamped but
diaphragm close to magnets 22
No dynamo sound

(22) Clamped, steel opposite side
of diaphragm from mica 28
(No dynamo sounds) But yet

(23) Same as above, door
closed 10

(24) Reversed diaphragm, steel
next to magnet. Door closed
Can't hear, diaphragm touches
magnet.

Test of 2 stage audion against 3 stage.

Used phonograph in box.
Regular Bee Receiver in
Molnar's room in regular
transmitter position as
transmitter. Door open

With 3 stage audion	5R
" 2 "	12

Door Closed

3 Stage Audion Regular Bee T.	36
" " Mr. E. T.	—

Connected up outputs of
3 stage audion to inputs of
2 stage audion.

With Bee Receiver on
transmitter table, with door
closed hear to 60

Box at 0 Loud

Noise 100% (95%) Sound 100% (5%)

Noise consists of a continuous hiss and very high pitched whistles interspersed with periodic breaks & pops

Box at 30

Noise 10% (50%) Sound 100% (50%)

Box at 60 (1/2%) (1%) Sound 2% (99%)

Test of 5 stage amplifier using Bunnell 11-2800 input and 5R0-100 output coils.

Circuit very noisy, apparently worse than last night when the W.E. input and output coils were used on 3 stage.

Noise does not diminish at 30 as before

Hear phonograph to 38

Found that in making these connections, we did include the resistances in shunt with the input circuit.

Connected up putting Bunnell coils in place of W.E. input and output.

Result very poor. Lots of noise. Sound low.

Then cut off 2 stage audio, using 3 stage only.

Both noise and sound weak. Could only just hear Dawson talking clearly in Beebe Receiver as transmitter.

Test of 3 stage amplifier:

To insure against mistakes, connected up 3 stage amplifier again.

With door open, could not distinguish phonograph. Changed Bell receivers. Got phonograph to 50

Noise Pronounced. With 1st Bell receiver used the dynamo noise was especially prominent.

With the second one used, the dynamo noise largely disappears and a high pitched non periodic roar appears.

It may be that the second is better than the first because the periodic phonograph sound is more pronounced with the non periodic roar than with the periodic dynamo sound.

This was taken with Rho 9700

1st switch Low
2nd switch high

Changed 1st switch to high.
Got periodic pump noise
showing continuous discharge

Noise increased with this but
was not able to hear phonograph
at any point.

Changed 1st switch to Low
2nd " " to Low
Noise very much diminished
hear phonograph to 16

Leaving 1st switch at Low
2nd " " at high
put Rheo at 5000 40
then down to 1000 (imm. later) 46
then down to 500 36
Rheostat on 100 16
noise reduced down to

① Rheostat at 100
1st switch high
mid " high
Ideas to

56

② Same Rheostat at 200
High pitched noise. Pump
annoying
Can hear only to

8

③ Rheostat at 100
Again get phonograph to
(pump sound annoying)

54

④ Rheostat at 50

34

⑤ Then connected up with 2
stage audio
Rheostat at 100
1st switch high
mid switch high
Sings high pitched notes -

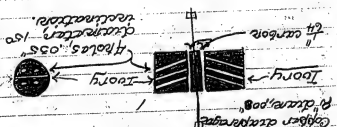
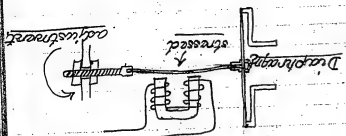
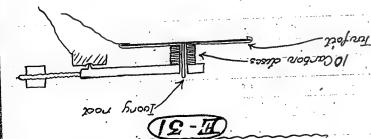
⑥ Then tried varied rheostat
positions & changes of switches
Got only a variety of noises

(7) During this time grounding
several portions among
them #4 w/ 1st - 2 stage audion.
Noise stopped and stayed
quiet.
Heard phonograph with
door closed to 60
Noise awful at low
readings but rapidly
cuts out.

(8) Then opened rheostat circuit
by switch. Could still hear 60
at

(9) Then threw switch to
high, leaving rheostat
open.
Noises on line very much
reduced - only high pitched
whistle and a periodic
quint. Can hear to 60

(10) Closed switch to rheostat
which was at 9000
Same as (1) in results 60
hear to



(11) Changed Rheostat to 900
Hear th 60

(12) Then changed switch #1
to low, Rheostat 900
noise increased but
could hear phonograph
distinctly at 60

(13) Permanently attaching
ground to 4 of first section
of two stage tube high
pitch note x diminishes
loudness to 46

(14) Removing this ground
brings back as at 12 th 60

(15) A 1 mfd condenser
around the power line
diminishes the noise
but does not diminish the
phonograph. Hear loud at 60.

[THIS BOOK WAS USED IN BOTH DIRECTIONS.
THE FOLLOWING PAGES WERE FILMED FROM
THE BACK END FORWARD.]

Description of
Transmitters.

(E-1)

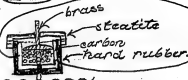
carbon diaphragm, $2\frac{1}{16}$ " diam.

carbon back, 18 foos, .025, inclined 15° .



(E-2)

Inertia
Type.



corrugated copper
diaphragm, $1\frac{1}{8}$ "
diameter.

(E-3)

0.03" copper
diaphragm
1 1/2" diam.

ivory
carbon.

← 32 holes, 0.05" circular
spacing.

(E-4) - 1st form

cor.
cop.
diap
fermag

brass
carbon

← 32 holes, 0.05" circular
spacing

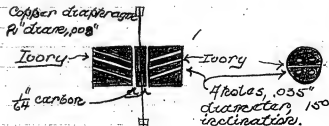
(E-4) - 2nd form.

flat
copper
dia.
0.03"

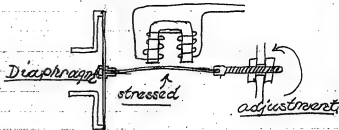
carbon

← same as above.

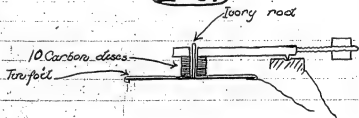
E-5



E-6



E-51



(15)

A 1 inch diameter
around the bottom in
diameter to make the
but does not diameter the
photograph, then level at 60.

(14)

forming this ground
lump look as at 12 ft

(13)

formant, adjusting
ground to 11 ft
at this stage quite high
then note x diameter
diameter to

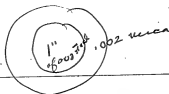
(12)

then changed out at #1
to low, raised 900
pieces measured but
diameter of

(11)

changed diameter to 900
then to

[ITEM(S) FOUND IN BOOK]



paper ring in - not clamped
#12 on box - 003 steel 1" dia
no dynamic sounds

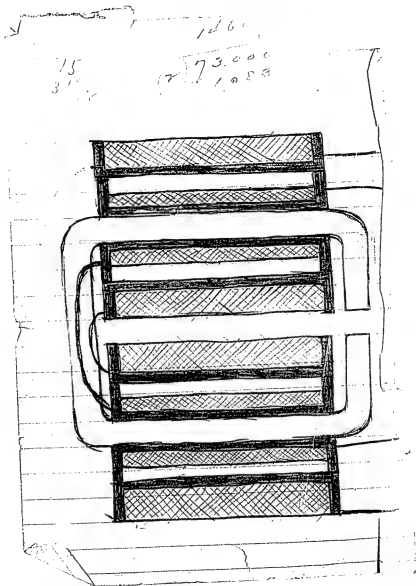
Paper ring out, not clamped
but closed #12, on box -
no dynamic sounds -

29
28
27
Clamped qrt #28 on box
But yet no dynamic
sounds steel opposite side
to magnet - on knee -

Door shut, #10 on box

Reversed dia steel next magnet
door closed, not clamped tight
Can't hear - dia touching magnet

[ITEM(S) FOUND IN BOOK]



**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments -- A. M. Kennedy Books
Notebook, N-17-04-05**

This notebook was used by Absalom M. Kennedy in April 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The book consists primarily of notes on experiments involving amplifiers, audion circuits, transmitters, and transmitter parts. Also included are notes describing experiments with the "Edison Effect." Several entries include notations by Edison or remarks by Kennedy about his opinions and suggestions. The notes indicate that E. Rowland Dawson and Joe Mellner also worked on these experiments and that some of them took place at sea near Sandy Hook and Red Bank, New Jersey. The front cover is labeled "Experiments #3 March 21 -." The pages are unnumbered, and some have been removed from the middle of the book. Approximately 120 pages have been used.

17-04-05

Jewett
Colbert
Shreve

69593
Acme Co.,

MFG. STATIONERS,
96 JOHN ST.
AND
19 PLATT ST.
NEW YORK.

On ~~disconnecting~~ ^{unsoldering} input coil
and connecting back by touching
terminals, got awful dynamo
noise from receiver, probably
due to imperfect contacts.

Tried to get better contacts

Experiments with W.E. 3 stage Amplifier.

- ① Switch Low - md switch high
Rheostat 9000.
Door open 60
Door closed 42
- ② Then disconnected W.E. output
coil and substituted Bunnell
520-100
Door open 58
Door closed 26
- ③ Then unsoldered contacts
of input coil and put back
by wrapping.
Receiver makes awful
dynamo noise so that
phonograph can not be
heard.
- ④ Nuts over these contacts
and clamped with pliers.
noise same as before.

⑤ Connected Bunnell.
 11-2800 Coil in as input.
 Door Open hear to 16
 Door closed " " 2

Mr. Edison decided that the Bunnell coils were insufficient as compared with the ¹⁰⁰⁰ Western Electric.

Took #47A (Qew #9) (1:1 ratio) apart. Superficial examination shows a closed circular iron core wound with 4 coils of about #26 wire on a circular core insulated a coarse woven cloth like cheese cloth between.

Mr. E then had me telephone N.E. Co. (Mr. Jewett was out - got Mr. Colpitt) to get winding specifications on #N. 192 and N. 188 repeating coils as input and output. These to be the size and number of turns each on

the primary and secondary
coils and the dimensions
and kind of iron in the
core.

Winding Specifications
of W.E. Repeating Coils
#s 188-W and 192-W.

W 188. Output,
Impedance Ratio of windings
6000 to 2000.

Has 4 coils of which 3-4
and 7-8 are low and 1-2, 5-6
high.

3-4 and 7-8 each has 1150 turns
#25, single cotton covered
copper wire.

1-2 & 5-6, each has 2000 turns
#31 single cotton covered
copper wire.

Core of silicon steel punchings.



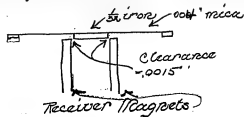
W19R. Input

Impedance Ratio of
windings = 900-500,000.

Coils 1-2 & 5-6 are made up
of 6 sections each containing
45 turns black enamel and
silk insulated #19 copper
wire & 270 turns for the two.
Coils 3-4 & 7-8 are wound over
these in 6 sections each
containing 1160 turns #32
Black enamel and silk insulated
copper wire

Core of silicon steel.

Test of Special Receiver



Used 3 stage audion
 1st switch Low
 2nd " High
 Resostat at 9000

With regular Bell receiver
 Door open 60
 Door closed 38

With special Receiver
 Door open 50
 Door closed 18

Readjusted this -.010" farther
 away from magnets
 Door open 54
 Door closed can not distinguish

The quality here is too full, gives
 a prolonged note rather than
 the clean, clear articulation

Then adjusted so that iron
was .005" closer to magneto.
Door Open to 60
" Closed to 52

With regular Bell Receiver as
transmitter
Door Open to 60
Door Closed to 40

Special Receiver as transmitter
adjusted so that armature
is .015" within magneto
Door Open to 54
Door Closed to 38

Adjusted back so that the
armature was .005" within the
magneto -
Door Open to 60
Door Closed to 50

Used Bell Niemann Transmitter
Door Open to 60
Door Closed to 56

bread
family food
cost of living

Quality Test of Magnetic Transmitters

Door open - standing at phone
Reading

Meremais Transmitter	5%
Standard Bell Receiver	10%
Meilners Transmitter	25%

In all of the above I could hear practically only the vowel sounds. Davidson then came closer & spoke lower so as to bring out the consonants.

standing at door Reading

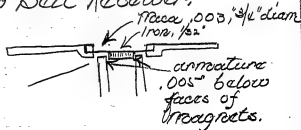
Meilners Transmitter	60%
Standard Bell	60%
Meremais Transmitter	58%

The above taken at 1/6 on box.

This is % of words

got
used 3 stage amplifier.
1st Switch Low - 2nd Switch high
Rheostat 9000

Test of $\frac{3}{4}$ " diaphragm
on Bell Receiver.



Used 3 stage amplifier
1st switch Low
2nd " High
3rd " 9960
Standard Bell Receiver.

Door Open 58
Door Closed 38.

New $\frac{3}{4}$ " diaphragm receiver
Door Open - can not hear
Get Dawson to talk over.
Not very loud.

Sizes of interference tubes.

Vibrations per sec	Short inches	Long inches	Diameter of tube, inches	No
150	44	88	2	1
175	38	76	2	2
200	33	66	2	3
225	29.7	59.4	2	4
250	26.4	52.8	2	5
275	24.2	48.4	2	6
300	22.	44.	2	7
* 325	20.42	40.84	2	8
350	18.84	37.68	2	9
375	17.67	35.34	2	10
400	16.5	33.	1½	11
425	15.58	31.16	1½	12
450	14.66	29.32	1½	13
475	13.93	27.86	1½	14
500	13.2	26.4	1	15
525	12.6	25.2	1	16
550	12.	24.	1	17
575	11.5	23.	1	18
600	11.	22.	1	19

Test of 3 stage amplifier
with new, rubber insulated
input coil.

1st switch Low
2nd " High
Rheostat 700

Hear noise to 60. This
noise is a high roar and
dynamo hum with noise
like a pump sucking
which happens about
20 times per minute

Don't open hear to 50
Don't close " can not
distinguish phonograph.

This is not as good as
before.

Then reversed connections
back on pickup coil to
be sure this was not the
trouble.

Still get noise to 60
it is more nearly uniform

but apparently as loud as before.

With door closed can not distinguish phonograph.

Then tried
1st switch high
2nd " high
Rheostat 800

Noise missing. phonograph
Could not hear with door closed.

Then tried rheostat at 400
Noise diminished
Could not distinguish phonograph with door closed.
Then tried 1st switch on low.
Noise about same
Could not distinguish phonograph.

Put 1st switch back on low, 2nd on high and the Rheostat at 900.

Put on ground connection.
Noise slightly diminished.
Can not hear phonograph with

Door closed.

Sunday morning.

1st switch Row
2nd " High
Rheostat 9906

Noise slight Cut out

50
60+

Door open hear to

Closed "

52

Noise is uniform, slight hiss
mixed with a high pitched note.

Test of Amplifiers

- ① Used 3 stage, standard coils and connection.
1st switch Low
2nd switch High
Rheostat 9900.

Noise slight. Cuts out 50
Door Open Hear to 60+
Door Closed Hear to 52

Noise is uniform and consists of a hiss mixed with a high pitched note. Pump like sounds 8 per minute, probably condensers discharge occurs.

- ② Then connected new hand rubber insulated coil in place of regular.

High pitched noise varied, switches, rheostat and took off input and output wires. Still noise.

Found that by touching one side of input wire and ground noise was

diminished. Tread condensers
in same place with same
effect.

pot. switched Low
and High
Phostat 9000.

Condenser, ^{input} line, one side
to ground connection (not grounded)
Input coil, 119V special
unshielded

Door Open to
Door closed to

60+
54.

- ③ Put 2 mfd condensers
around resistor in booth

Noise seems diminished

Door Open to
Door closed to

60
42

- ④ Put 2 mfd condensers
around input line & ground con.
Noise diminished into out. 54
Door Open
Door closed

60
58
53

Shunting receiver in booth
cuts down noise but
diminishes sensativeness.

- ⑤ Put 1 mfd condenser around receiver in booth.
Door open to 60
Door closed to 46
- ⑥ - With fresh A battery on amplifier, again tried effect of connecting 7 mfd. Condenser from one side of input line to ground connection.
Cut down noise, which was high pitch note 75%
- ⑦ Then tried 1 mfd additional. noise changed from note to roar. Not as good.
- ⑧ Then tried resistance across this (input line to ground connection).
Diminished noise 10,000 ohms about to same amount as 7 mfd condenser. Cut this resistance by steps to 0.

This effect of shorting one side of input ~~with~~ line with ground connection is peculiar.

This ground connects to +A-B Battery and to the center of the primary coil of input coil. The +A-B Battery multiplies in on one side of the filament circuit of each audion lamp.

Diminishes noise only slightly.

- | | | |
|---|---|-----|
| ⑨ | 10,000 ^Ω between input line and ground connection. | 60+ |
| | Door Open | 50 |
| | Door Closed | |
| ⑩ | 5,000 ^Ω as above | 60+ |
| | Door Open | 54 |
| | Door Closed | |
| ⑪ | 2,000 ^Ω as above | 60+ |
| | Door Open | 54 |
| | " Closed | |
| ⑫ | 1,000 ^Ω as above | 60+ |
| | Door Open | 56 |
| | Door Closed | |
| ⑬ | short circuit as above | 60+ |
| | Door Open | 56. |
| | Door Closed | |

⑭ Then changed this, connect
ion to other leg of input
circuit marked TO
Door open 60+
" closed 56,

⑮ Then connected input
line direct to new input
coil. 3' and 8 of this
to connections in box
this cutting out the
shunt & series resistances
in the input circuit.
Makes peculiar roaring
noise interspersed with regularly
spaced clicks

Door open

30

While making above
connections found solder
loose on connection to # 3
of input coil & resoldered
it.

- ①⑥ Then connected input lines to input terminals of box.
The high pitched note heard before had disappeared and in its place a sort of roaring sound interspersed with clicks.

Then connected one line to ground connection
Noise diminished 80%

Door open 60
Door closed 58

- ①⑦ Then replaced output coil of box by new insulated output coil.
Door open 60
Door closed 58

- ①⑧ Then connected 3 step audition box as input to 2 step as output.
Bad case of shuffling.

(19) Connected +A-B battery
of 7 stage to ground connection
of 3 stage rts.
Too quiet. I am
afraid of it.

Door Open
Door Closed

30
20

(20) Then removed
connection from input
line to ground connection
Circuit very quiet

Door Open. Can not hear.

(21) Then removed connection
+A-B of 2 stage from ground
connection of 3 stage.
Awful low pitch noise

(22) Then, having removed
above connection, connected
+A-B battery of 7 stage
and ground of 3 stage to
ground

Door open

Can not hear
phonograph

(24) Connected ground connection
of 3 stage to #3 of 1st
division of voltage set
Door open to 30

(24) Ground of 3 stage set
to #4 of 1st division of
voltage set.
Door open to 60+
Door closed to 54.

Suggestions for improvement
of 5 stage amplifier circuit.

- ① Keep input and output
apart, conductively, &
inductively.
- ② Shield inputs circuit throughout.
Also all cross connecting
wires of lead covered cable.
- ③ Put B Battery of 2 stage
out in tin lined box, thoroughly
insulating the cells from each
other.
- ④ Mount units of 2 amplifier
set on hard rubber and
mount all on a board.

Test of Diaphragms.

Used 3 stage Amplifier.
1st switch at Low.
2nd " High.

Rheostat "9900."

2 wires of input 4 grounded
Ground connection "

① Standard Bell Receiver as transmitter
Door Open 58
Door Closed 48.

② Mica Diaphragm .025"
Iron Disc .010" x 1.00".
Disc Outside, Away from Magnet
Quality - Better than ①. Not so
much false Ring & noise
Door Open 78
Door closed 58

Remind Mr. E
of pencils in booth
of Sandy Hook

NE suggestion of
tuned circuits between
audio hook & time sub
any note

- ③ Mica Diaphragm .002"
Iron disc on center .003" x 1".
Disc outside, away from magnet.
Quality not as good as ② sharp.
Door Open 46
Door Closed 40
- ④ Mica Diaphragm .004"
Iron Disc on center .003" x 1".
Disc outside, away from magnet.
Quality little sharp.
Door Open 50
Door Closed 42
- ⑤ Mica Diaphragm .004"
Iron Disc on center .010" x 1".
Disc outside, opposite magnet.
Quality insignificant. Noisy.
Door Open 44
Door Closed 40
- ⑥ Diaphragm of steel .003"
Quality good. P. all material.
Door Open 52
Door Closed 46

- ⑦ Mica Diaphragm
 Iron center fitting between
 magnets. .001 $\frac{1}{2}$ clearance
 projecting .005 below face
 of magnets, $\frac{1}{32}$ " thick.
 Quality good. Clean.
 Door Open
 Door Closed

60
 52

- ⑧ Mica Diaphragm .002
 Special Iron Disc .020 x $\frac{1}{16}$
 shaped around magnets
 .002 clearance .005 below
 face of magnets



Quality good
 Door Open
 Door Closed
 Door Open

60
 50
 52

For noises - look out for-

- ① Poor contacts (Sing & Roar)
- ② Induction from any source (Reproduction of the source)
- ③ Coupling back between higher stage bottles and lower. (Sing & chirrup)
- ④ Gassing of battery -
either A or B (Hissing & roaring sound)
- ⑤ Unbalancing of lines as to length, particularly as to their capacity. (Hissing & sing or change note on singing)
- ⑥ Leaks between or around coils.
- ⑦ Audion tubes maybe defective & should be replaced if suspected
- ⑧ Defective B Battery. Dry cells increase resistance & make noise

Test of plug in tone of photograph box.

- ① Standard Bell Receiver
Cork in photograph hole
Door open 50
Door closed 42

- ② Standard Bell Receiver
Tone Open 50
Door open 42

Plugging this hole in the photograph therefore makes no difference

Previous experiments made with output leads from 2 stage amplifier direct to receiver. But no regular output coil.

- ③ Regular Bell Receiver, Plug open 54
Door open 54
Door closed 46

④ as ③ but with Rec. Recens
faced away from Phonograph
Door open 54
Door closed 44

⑤ as ④ but with phonograph
turned to wall.
Door open 54
Door closed 42

⑥ as ④ but with phonograph
in cabinet in Kennedy room
Door open 48
Door closed 36

⑦ as ② but with mute in
horn of phonograph
Door open Cant hear

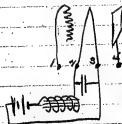
⑧ as 7 but with phonograph
out of box
Door open 52
Door closed 42

⑨ as ⑦ but with lid of
phonograph box open
Door open
Door closed

36
26

Experiments on
Audion Amplifiers
by Mr. Scriber.

- ① Exchanging ground from + battery to - battery as shown on blue print changes and increases the noise.
- ② Putting an impedance in the A battery circuit, reduced the hissing, trying noise on the 3 stage amplifier.
- ③ Putting an impedance in the A battery circuit of the 1st audion, cut down the hissing, trying noise. A condenser of 18 mfd. across the filament seemed also to keep



In this the 3 stage set had
 a .05 coil on the 2d. audion in
 place of 1 as. visual and
 had impedance coil between
 battery and 1st audion and
 8mf. condenser around
 filament. Ground connection
 of set was grounded.

- 4 stage set.

- ① Input line disconnected to get
 noise in set. 54
 Hear noise to
- ② Same as ① but with coupler
 of 3 stage set on. 50
- ③ Same as ② but with input
 line connected 58
- ④ Same circuit as ③
 Door open, hear to 60
 Door closed, hear to 46
- ⑤ Mr. Scriben then put the
 L type lamp back in the
 2d stage of 3 stage amplifier
 and connected up this to
 receiver, leaving only a
 3 stage set.
 Door open, hear to 36
 Door closed, " " 36
 (ant. hear)

- ⑥ Mr. Deruena then found the
A battery low, and raised
to normal voltage
Door open hear to 38
Door closed hear to 6
- ⑦ Mr. Deruena then removed
the ground connection
Door open hear to 48
Door closed " " 14
- ⑧ Mr. Deruena then exchanged
lamps on 3d audition
Door open hear to 46
" closed " " 14
- ⑨ Mr. Deruena then put 1st
switch on high.
Door open 58
Door closed (noise outside) 12(?)
- ⑩ Mr. Deruena then took off
impedance & condenser & 1st
lamp
Door open to 38
Door closed to 22
more noise

Scriven

- ⑪ Mr. Scriven reversed diaphragm
in receiver & removed ring -
Door Open 60
Door Closed 52
- 9:15 PM.
- ⑫ Repeated 11 to guard against
mistake.
Door Open 60
Door Closed 52
- ⑬ 1st switch changed to High
Door Open 60
Door Closed 60
- ⑭ As 13 but with Bell
Receiver fixed down on
plate glass
Door Open 60
Door Closed 44
- ⑮ As 13 but with muffler
in horn of phonograph,
box top open.
Door Open 60
Door Closed 54

⑥ As 15 but with lid of box closed

Door Open
Door Closed

28

Cart drawings

⑦ 1st switch low
mid " high

Phostat 9900

3d stage tube in place if L

Phonograph - standard

Door Open

Door Closed

(noise very little, good)

60

56

⑧ As 17 but with L tube in
third stage.

Door Open

Door Closed

60

58

⑨ Then began tests to localize
& remove noise

→ Removed input wires.

Noise out out at

40

⑩ Input wires on
noise

44

(22) Input wires off. Binding
ports short circuited.
Noise 18

(23) Input wires on, extra
impedance coil in 1st
audion filament circuit
Noise 36

(24) Same as 23 but diaphragm
removed from receiver at
transformer end.
Noise 38

(25) As 24 but with 8 mfd
condenser across filament
of 1st diode.
Noise 32

(26) As 25 but with Bee
receiver, diaphragm out,
across input terminals in
place of input line.
Noise 28

②7 As 26 but impedance
coil in filament circuit of
2nd audion, 28
Noise
(Picked up dynamo noise)

②8 As 27 but with type B
bush in 2d stage in place
of type R Noise 18

②9 As 28 but with impedance
put in in 27 removed Noise 18

③0 As 29 but with 4th stage
audion added.
Door Open 60+
Door Closed 60+

③1 Noise reading of 31 with
Pul. Reson., diaphragm removed
connected across input
terminals of 3rd stage amplifier Noise 58

(32) As 30 but with ~~Resonance~~
~~uprights~~ down on plate glass
Door open 60+

" Cloud 60+

(33) As 30 but with muffler
in phonograph, lid open 60+

Door open
Door closed 60+

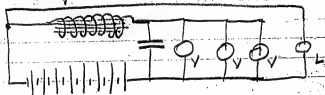
(34) As 33 but with lid of
phonograph closed 60+

Door open
Door closed 54

Perts in 9 volt battery
on 4th stage of amplifier.

With storage battery as B battery
put high impedance coil in
common with all V tubes, leaving
L clear.

10 or 12 mfd condens around
battery and coil



Experiment of changing impedance coils of 3rd and 4th stages.

With 4 stage amplifier as
set up

Noise 60
With 4th & 3d stage impedance
coils exchanged.

Just hear it 60+

Completed test of 4 stage set.

Noise figure

Just hear it 60
Noise consists of slight fry
or hiss, dynamic sound,
and an occasional click.

Efficiency

muffled in phonograph horn

Ed open -

Door open to

Door closed to

Control 60

So much noise around, impossible
to hear.

Test of Audibility Limit
with 4 stage Audions.

- ① Muffler in Phonograph
Box lid closed
Door open 60+
Door closed 56
- ② As 1 but with Bell removed
in corner of Mulners Room
Door open 60+
Door closed 54
More noise than 1, probably
because transformer is
closer in contact with
building by being close
to wall.
- ③ Same as ① but with Bell
removed just outside door
in Music Room. Door between
Keweenaw & Mulners room closed.
Door to music room open 30
Door " " closed 0

Can not distinguish Phonograph.
Other noises conceal it.

✓
④ Same as 3 but changed
record to Fox trot.
Music Room door open 56
" " " Closed 57

⑤ Listened in for quality of
music at 10 on back
Same position of receiver
as in ④
Ht 40% of the record.

⑥ Same as ⑤ but with box
at 0
Could get 60% of melody.

⑦ Same as ⑥ but receiver
moved to end of shelf

⑧ Same as 7 but with receiver
out of music room, in

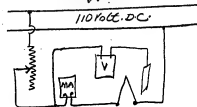
✓

Relation of Readings of Receiver Short Boxes.

According to curve made out by Mr. Selmer, the readings of short boxes are relatively:

0 = 1 = 100" %	30 = 3%
2 = 1.3 = 77'	32 = 2.9
4 = 1.6 = 62.5	34 = 2.4
6 = 2. = 50.	36 = 1.9
8 = 2.4 = 41½	38 = 1.5
10 = 3 = 33	40 = 1.25
12 = 3.7 = 27	42 = 1.00
14 = 4.6 = 22	44 = 0.80
16 = 5.8 = 17	46 = 0.65
18 = 7.2 = 14	48 = 0.52
20 = 9 = 11	50 = 0.41
22 = 11.1 = 9	52 = 0.34
24 = 13.8 = 7½	54 = 0.27
26 = 17 = 6	56 = 0.21
28 = 21 = 4½	58 = 0.16
30 = 26.6 = 3¾	60 = 0.14

✓ Experiments with Edison Effect



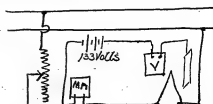
Current	Reading 1/3100t M.A. scale	Difference	Reading 1-150 volt Scale	Difference
150 amp	0. Volt.		0. Volt	
.160	.02	.02	.1	.1
.170	.09	.07	3	2.9
.180	.26	.18	9.5	6.5
.190	.62	.36	22.	12.5
.200	1.44	.82	38	16.
.210			44	6.
.220			49	5.
.225			51.	3.

C. represent
 V. without B. Diff
 .000285
 .000715
 .001708
 .00349
 .00675
 .00972
 .01397
 .01775
 .02120
 .02260
 .02400

C. rep. V. unit
 133V. Battery
 .000858
 .00223
 .00430
 .00807
 .01509
 .02120
 .02950
 .03250
 .05310
 .06450
 .07100

$R =$
 237,110
 970,000
 121,900

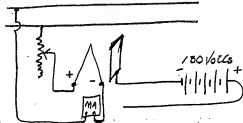
Further Experiments with
 Edison Effect using
 B Battery.



.002857
 .0005714

Current thero filament	Diffen	V. without B. Battery	Diff	V. with 133 Volt B. Batt	Diff
160		.5		1.5	
165	.005	1.25	.75	3.9	2.4
170	.005	3.	1.75	7.5	3.6
175	.005	6.1	3.1	14.1	6.6
180	.005	11.8	5.7	26.5	12.4
185	.005	17.	5.2	37.	10.5
190	.005	23.	6.0	51.5	14.5
195	.005	31.	8.0	65.5	14.0
200	.005	37.	6.0	93.	27.5
205	.005	39.5	2.5	12.5	19.5
210	.005	42.	2.5	124.	11.5

Further Experiments with Edison Effect.



Filament Current	Volts, Plate to + filament	Volts, plate +150 volt batt. to + filament	Volts, plate +150 volt batt. to - filament.
.160	0	2	65
.165	1	3.25	68.85
.170	3	4.25	71.5
.175	5	7.50	74.5
.180	7.5	12.50	81.
.185	11.5	19.50	84.25
.190	19.5	37.00	87.5
.195	26.5	54.	91.25
.200	38	90	94
.205	46	101	98.25
.210	50	126	102.5

✓
Test of Diaphragms for
Deflection under pressure.

Russian Iron

#1 = .0155 - .0145 - .0145 - .015

Diameter $2\frac{5}{32}$ "

Pressure	On	Off	Difference	Set.
0	.167	.167		
5	.185	.167	.042	0
10	.118	.167	.049	0
15	.110	.167	.057	0
20	.107	.166	.059	.001
25	.101	.166	.065	.001
30	.096	.167	.071	0
35	.088	.131	.043	.036
40	.082	.120	.038	.047
45	.076	.111	.035	.056
50	.067	.095	.028	.072
55	.059	.084	.025	.083
60	.051	.076	.025	.091
65	.048	.069	.021	.098
70	.040	.040	0	.127
75	.025	.045	.020	.122
80	.025	.043	.018	.124
85	.020	.039	.019	.128

Russian Iron

#2 = .0205; .020; .020; .0215

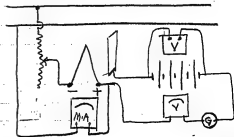
DIAMETER R $\frac{3}{32}$ "

Pressure	On	Off	Difference	Set
0	.154	.154		
5	.138	.153	.015	.001
10	.127	.152	.025	.002
15	.121	.151	.030	.003
20	.116	.150	.034	.004
25	.111	.150	.039	.004
30	.105	.146	.041	.008
35	.100	.141	.041	.013
40	.093	.128	.033	.028
45	.086	.119	.033	.035
50	.080	.108	.028	.046
55	.073	.099	.026	.055
60	X .066	.060	.046	.094
65	.046	.060	.026	.094
70	.045	.058	.013	.096
75	.044	.057	.013	.097
80	.041	.055	.014	.099
85	.037	.052	.015	.102
90	.032	.047	.015	.107

Russian Iron
 #3 = .027 - .027 - .0265 - .0265
 Diameter 2 $\frac{5}{32}$ "

Pressure	On	Off	Difference	Set
0	.150	.150	0	
5	.138	.150	.012	0
10	.132	.150	.018	0
15	.127	.150	.023	0
20	.125	.150	.025	0
25	.120	.149	.029	.001
30	.116	.148	.032	.002
35	.113	.147	.034	.003
40	.109	.1465	.0375	.0035
45	.105	.146	.041	.004
50	.102	.145	.043	.005
55	.097	.139	.042	.011
60	.092	.132	.040	.018
65	.090	.126	.036	.024
70	.0865	.124	.0375	.026
75	.081	.114	.033	.036
80	.077	.109	.032	.041
85	.073	.100	.027	.050
90	.067	.093	.026	.057

Further Experiments with Edison Effect.



1 Filament Current	2 Volts, + filament to plate	3 Volts necessary to reduce col. ratio 0.
.160	* .75	65.
.170	✓ 8.	71.5
.180	✓ 9.	81.
.190	✓ 20.	87.5
.200	✓ 38.5	94.
.210	✓ 49.5	102.5
.214	52.	106.5

Test of Diaphragms for Deflection under Pressure

4

Mica

.010

Diameter $\approx \frac{5}{32}$

Pressure	On	Off	Difference	Set
0	.192	.192	0	0
5	.150	.192	.042	0
10	.143	.192	.049	0

Burst at 15 pounds

Test of Diaphragms

#5

Mica

.0175

Diameter $2\frac{5}{8}$ "

Pressure	On	Off	Difference	Set
0	.180?	.180?	0	0
5	.160	.184	.024	0
10	.150	.184	.034	0
15	.145	.184	.039	0
20	.142	.184	.042	0
25	.1375	.184	.0465	0
30	.131	.184	.053	
35	.			

Burst at 35 pounds

Test of Diaphragms

6

Mica

.002

Diameter 2 $\frac{5}{8}$ "

Pressure	On	Off	Difference	Set
0	.182	.182	0	0
5	.166	.182	.016	0
10	.159	.182	.023	0
15	.150	.182	.032	0
20	.145	.182	.037	0
25	.141	.181	.040	.001
30	.138	.181	.043	.001
35	.133	.181	.048	.001
40	.130	.181	.051	.001
45	.127	.181	.054	.001

Burst at 50 pounds

Test of Diaphragms

#7 German Silver
 .0105
 Diameter $2\frac{5}{8}$ "

Pressure	On	Off	Difference	Set
0	.190	.190	0	0
5	.145	.190	.045	0
10	.135	.190	.055	0
15	.134	.190	.056	0
20	.121	.185	.064	.005
25	.111	.175	.064	.015
30	.108	.150	.048	.040
35	.090	.130	.040	.060
40	.065	.100	.035	.090
45	.052	.083	.031	.107

Burst at 50 pounds

Test of Diaphragms

German Silver

#8

.020

Diameter $\frac{5}{32}$ "

Pressure	On	Off	Difference	Set
0	.188	0	0	0
5	.163	.188	.025	0
10	.152	.183	.031	.005
15	.147	.183	.036	.005
20	.139	.183	.044	.005
25	.133	.182	.049	.006
30	.128	.182	.054	.006
35	.125	.182	.057	.006
40	.122	.182	.060	.006
45	.117	.182	.065	.006
50	.112	.181	.069	.007
55	.107	.177	.070	.011
60	.102	.170	.068	.018
65	.097	.153	.056	.035
70	.091	.140	.049	.048
75	.084	.129	.045	.058
80	.079	.118	.039	.070
85	.071	.108	.037	.080
91	.066	.094	.028	.094
95	.055	.087	.032	.101

Preliminary Tests
at Sandy Hook.

- ① Using transmitter #3 with
" break and 2 cells battery and
with receiver #2.

In water, hear to
In air, hear to

12"
26"

- ② Same as 1 but using receiver #1
in place of #2

In air hear to
In water hear to

26"
12"

- ③ Transmitter #1
Receiver #1
Hear in water to

45'

4/4/17. Weather - warm & fair

Put impedance in 1st audion
B battery line.

At Sandy Hook

4/5/17

Set up Audion Set.

- ① Using Read Covered Wire.
Noise, slight roaring with
slight bee noise.
Cuts out at

52

- ② Put impedance coil in
B battery circuit.
Chirups badly.

4/5/17. Weather Cool. High Winds.
Rain & storm in afternoon
and night with some sleet.

Book - Day Unit

4/6/17.

Weather

Disastrous, cloudy, foggy,
sea choppy - cold.

Heard this morning at breakfast
that war was declared at 9:30 am.

- ① Test to determine noise of waves. Made from dock. Receiver #1, head 2" under trough of waves.

Without audion hear noise to

18.

- ② Same as 1 but with audion's hear noise to

60

This noise is a roar mixed with clicks of carrying interest.

- ③ Same as 1 but with receiver #2 at various depths. No audion.

Noise of waves.

Noise slight hear to

$\frac{1}{2}$ pole length 18"

8

16

At surface again

10

14

$\frac{1}{2}$ pole length 18"

18

$\frac{1}{2}$ pole length 36"

16

13 " " 4 1/2'

60

#2 Reciever Less sensitive
than #1.
Suggest it take to equalize
pressure.

2	pole lengths	6'	12
2 1/2	"	7 1/2'	10
3	"	9'	12
4	"	12' noise changes	12
	here, can not hear the flow of water, but hear rather the dash of waves against dock		
5	pole lengths	15'	12
6	"	18'	12
7	"	21'	10
8	"	24' (on bottom)	10

11:35 Am.

Tug came in around point to
land mine material.

Connected on audions with #2
reciever. Could hear engines
plainly at 500 yards. Could hear
her slow down and then stop
when for making landing at
about this distance.

Did not hear propellers but
could hear the pop or clack of
engines as the pistons went
up and down.

With audions in the noise is terrific without the receiver shunt boxes.

At 60 the smaller noises are strained out and only the wave dash against the piling can be heard.

It will be necessary to strain out extraneous elements.

Suggest N.E. Electrical Method.

④ Same as ③ but with audion connected up.

at surface noise to				60
1'	under surface	"	"	60
3'	"	"	"	60
6'	"	"	"	60
9'	"	"	"	60
12'	"	"	"	60
15'	"	"	"	60
18'	"	"	"	60
21'	"	"	"	60
24'	"	"	"	60
3'	"	"	"	60

not as loud

only little louder than at 24'

Pounding of waves against
pier, rocks it and makes
an awful sound.

4/7/17.

Weather - Stormy, cloudy in
morning, clear in
afternoon heavy wind
and rough sea all day.

On arrival back with rope, saving
#3 recovered eels and made
preliminary noise test.

- ① Noises are - a continuous
roar and intermittent screeching
sound. The roar, I think is the
combined noises of white caps,
waves against piers, piles etc.
The screeching, the motion of
water in the funnel against
the diaphragm.

Noise can last to

60.

- ② Without audion, using #3
recovered.

Noise - could not hear anything.

To make sure that there was
nothing wrong with ②, connected

The air tube to #3 receiver has broken loose twice. For this work, it will be necessary to make all fittings, strong and rigid so as to stand the impact of the waves, and rough handling of swinging overboard.

~~#2 Receiver also has an overaged ring over the diaphragm which clamps it so tight that we can not remove.~~

~~Our facilities for repairs here are less than in the past. That parts should be designed to be readily repaired.~~

through with transmitter and receiver. Could hear through OK.

③ To test circuit of ②, drew #3 receiver up out of water and talked through it. Could hear both with direct circuit and through audions.

④ To test and see if audions were working well, connected a Bee receiver as transmitter in audion line. The high wind and dash of waves outside made a terrific noise over this. Speaking close was too loud to transmit. Speaking at 24" was as close as articulation could be distinguished. Seemed to show that audion circuit is OK and very sensitive.

⑤ Disassembled Receiver #3 to see if OK. Found Chatterton compound around air tube.

It is evident that theory of sound being only about 1/60 amplitude in water seems good.

We should therefore have transmitter which will give 60 times the electrical impulse as present an one.

This may possibly be accomplished by having a heavier diaphragm and adjusting much closer.

cracked, tube loose, diaphragm showing effects of electrolysis. Took apart, dried out and vaselined all iron parts and reassembled.

⑥ Tested out receiver #3 by taking in it. Found it OK, apparently louder than ⑤, both direct and with audions.

⑦ Let #3 receiver under water. Noise less than ①, sounds clearer & clearer.

⑧ Used transmitter #2 to receiver #3. Could hear clearly at 6' and at 50'.

4/8/17 Sunday

Weather - Morning - cool,

cloudy rough.

Afternoon, wind became
less and sea calmed
down so that we
went out in boat.

Get row boat from coast
guard.

Two guards volunteered and
with Dawson went out.

Used Transmitter #2, Receiver

#3.

①	At	50 yards	heard plainly.
"	"	100	" "
"	"	200	" "
"	"	500	" "
"	"	750	" "
"	"	850	" "
"	"	1000	not sure could not distinguish.

The clap of oars is so like the
clanking of the hull that it is
difficult to distinguish.

Transmitter #3 is evidently very weak as compared with #2. It sounds too much like the general noises. So not distinctive enough.

② Using transmitter #3 receiver #3.
 at 50 yds could not hear
 Back to 1 yard Hear plainly
 at 10 " Hear
 at 20 " Just Hear
 at 30 " Can't Hear

③ I went out in boat and panned here, 3 steps-1 second interval & 3 more. Dawson listened.

100 yds	heard
200 "	"
300 "	"
500 "	"
600 "	"
750 "	"
900 "	"
1000 "	"
1200 "	"
1400 "	"
1500 "	"

Signalled me to come in because I was getting near strong current which would carry me to the reefs.

- ④ Feed break wheel in input circuit. Noises come with it making it prominent. Also the air gap break outside booth makes so much noise it disturbs readings inside booth.

4/9/17.

Weather - Very cold - Fair -
1 high tides - Rough sea
all day.

Sealed map to locate distance
points in testing.

- ① Dawson Moore went out in
boat taking transmitter #2.
Used Resonator #2.

Noise of waves so loud
could not distinguish at 100 yds.
Wind so high & waves so rough
could not stay out.

Notes. 4/14/17

4/14/17.
Weather - clear, mild, very little sea.

Position - off Red Bank, in H. Shrewsbury Co.

Using - Transmitter #2 (E. Bee).
 Receiver #3 with Tunnel.
 Depth of water at Receiving
 boat 8 ft.

① Position Trans. Boat Red Bank
 Depth water 2 1/2 ft.
 Distance from Receiver 700 yds.
 Hear to Hear plain

② Position Red Bank
 Depth Middle Creek
 Distance 10 ft.
 Hear to 1575 yds.
 Could not hear

③ Position
 Depth
 Distance
 Hear to



1750
 700

1750
 1575

4/7/17.

Same as previous page except
now boat used to get small intervals.

③ Low
High

60
60
100 yds
9'

④ Low
High

50
60
250 yds
9'

⑤ Low
High

46
60
350
10'

⑥ Low
High

40
60
450
9'

Can hear launch going
away for about 300 yards.

Rope noise prominent. must
find a better means of
suspension.

⑦ Low
High

32
58
600'
12'

⑧ Low (wind coming up getting
High choppy out)

12
40
700
21'

⑨ Low (S.E. wind) Turned back
High choppy but

6
30
800
18

⑩ Low
High

4
16
1,000
15

⑦ Low
High

Can only occasionally hear
" " " low at 10
1200
.18

4/15/16.

Because of short distance readings yesterday, as day was fair with only slight wind, decided to make readings in the bay from Atlantic Highlands pier towards Port Hancock wharf today.

Found moderate N.W. wind producing more waves than anticipated.

Depth out lost. Sea too high.

Came in made for buoy at Red Bank.

(13) Low
High

56
60

(14) Low } Lost this reading. Rows
High }
Boat had gotten over into shallower water so that reading was practically lost.

Notes —

① Can not hear behind
banks

② Probably a pair of good lead
telephones would be better with
this outfit than single lead
phone as it would be more
sensitive & cut off other ear

⑮ Back to 100 yds in advance

① Low
② High

60
60
100 yds
80'

⑯ Low
High

60
60
200 yds
15'

⑰ Low
High

48
60
300 yds
14'

⑱ Low
High *Mind*

20
36
400 yds
14'

Break thru
Side of dam

① Low High ~~Wind~~ ^{comes up} ^{noise}
^{making} ^{above & below}
^{water}

10

36

50 yds

18'

② Low High ~~Wind~~ ^{much noise}

0

14

600 yds

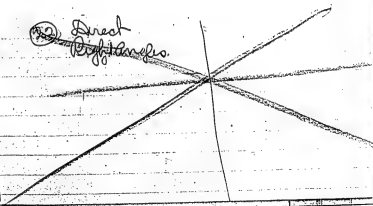
11'

③ Direct
Right angles

40

42

④ Direct
Right angles



Tests to make

- A. Distance
 1. Outside in bay
 2. Off Red-Buoy
 3. From Point
 to determine effect of depth of water.
- B. Distance can hear with horn pointing at source of sound and sideways to source to determine effectiveness of horn as a deflection finder.
- C. Test relative loudness of Transmitters 1, 2, and 3.
- D. Make up buoy and anchor to try leaving #3 horn outside and away from boat to eliminate noise

4/16/17.

- A. Dred stern of tender out of water & packed stuffing box.
- B. Put new dry batteries in tender.
- C. Exchanged wheels in audions. This out seems to be quite sensitive.

Moderate N.W. wind made river choppy. Ran over to cove on opposite side of river to get short distance readings and to test out sensitiveness of audions.

Transmitter # 3

Receiver # 3 with funnel

(22) 25 yds
Low
High

60
60

(23) 35 yds
Low
High

60
60

25 100 39.
During previous reading wind was quiet. Snapped down to 100 yds but wind had puffed up. Could not hear.

Noise is a great factor in the game.

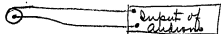
(24) Let Row boat drift out carrying #3 transmitter. Could hear to about 75 yds. Could not distinguish beyond this.

(25) Then sent out row boat on end of line to 55 yds. Found that by interchanging buicks 1 and 2 on audions could get sound a little clearer & cleaner.

(26) A connected up break wheel in input circuit, having #3 transmitter and funnel connected in.



On running break wheel, got very great noise, too much for use.
B Then took out #3 horn, running only break wheel in input circuit.



Still got noise from this.

C. Then changed from lead covered input, as advised by M.E. Co to straight twisted pair as previously used in Lab. On connecting up and running as B, got no noise from break wheel. This noise was evidently obtained by alternate charge & discharge of the sheath.

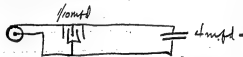
D. Then took lead sheath input back on, and grounded the sheath. ~~Diminished noise only slightly.~~

It is evident that when break wheel is used on one side of line as in this case, lead covered wire

can not be used as input in
spite of M.C. Co. advice on this.

- E. Found results in C and D to be
mistaken - reason being that the
input wire substituted for
lead sheathed input was
short circuited. On using
well insulated pair, the break
makes considerable noise
with regular twisted pair,
not quite as much as
with lead covered however.

- F. Added 4 mfd. condenser
around $\frac{1}{10}$ mfd. at present
around break



This reduced the noise of the
break slightly.

27. Using #3 Resumer with
funnel and with break
wheel using air break,
ran tender down stream
directly away from horn.
Could not distinguish
propeller noise from
other sounds and noises
coming from wheel horn.
On remaining break could
hear chug, chug of engine
for about 200 yards.

28. Experiment to compare
bells 1 and 2.
at 500 yds - Low
Hear #1 to 32
" #2 to 38

29. Same as 28 but to
yards
Hear #1 to 28
" #2 to 34

30 Same as 29 but to y/s
 Set #1 to 18
 " #2 to 28

31 Same as 30 but to y/s
 Set #1 to 2
 Set #2 to Low 6
 " " 2 High 14

32 Test of horn painted
 direct and at right
 angles.
 60 sigs.
 #2 Transmitter
 #3 Receiver with funnel
 Direct at 58
 Right angles 58

4/17/17.

Beautiful day without wind or waves.

Took readings about 150 yds off pier at Sandy Hook.

Used Transmitter #2 - (Range E & Bell)

Receiver #3 with Tunnel

(32) Distance (250) (150)

Low

60

High

60

Hear overtones of bell both close up and at this reading.

(34) Distance (500) (1700)

Low

60

High

60

Hear the engine & propeller of a tug both on "low and high", more than a mile away.

Get readings
with thicker diaphragm
#3, with and without
funnel.

(35)^c Distance 900 (1750)
Low 54
High 60
still hear tug though she is
as busy off Lynn Kroll
3500 yds away.

(36)^a Distance 1400 (2000)
Low 40
High 52
Can not hear tug on low
but can still hear on high
although she is out of
sight around Sandy Hook
point.

(37)^E Distance 1800 (3250)
Low 28
High 44

Tug and all regular sounds
now lost. Only noise is roar
of Hudsons. The ideal day
for work.

38 F Distance (2700) (2700)
Low
High

18
38

39 A Distance 2600 (2600)
Low
High

20

(mistook signals and had to stop) did not get

S.W. breeze started up here. ~~Seems~~
sea like glass before.

Sea picked up before S.W.
Breeze.
Ran in to Red Bank
and anchored near
Red Buoy.

Made tests of comparative
values with recorder # 3,
funnel off and on.

(40) Transmitter # 2. Large ^{SP} Bell

100 yards
With funnel low 60 high 60
Without " " 38 " 60

200 yards
With funnel low 28 high 44
Without " " 30 " 52

300 yards
With funnel low 22 high 38
Without " " 16 " 34

Repeated experiments

100 yards
With funnel low 54 high 60
Without " " 18 " 36

200 yards
With funnel low 42 " 54
Without " " 4 " 22

300 yards
With funnel low 24 " 42
Without " " 0 " 6

↑
Can not distinguish

4/18/17.

On arrival back from Orange, the weather being fine, went out and anchored off N.J.C. Pier in Sandy Hook Bay.

Made series of tests to find relative loudness of #3 Receiver pointed direct at source of sound and at 90° from it.

These tests proved unreliable. Reason later found to be that the second circuit was on "low" in place, of high and all readings were too low.

Made also series of tests to find comparative values of #1 & #2 transmitters with same results.

During this time the wind had come up making the bay somewhat rough.

Later in afternoon made following tests:

Tests to determine relative values of #3 Receiver with
 Tunnel pointed directly at
 source of sound (#2 Bee)
 and pointed 90° from
 direction of sound

(41)	500 yards.		
	Pointed at Source	{ Low	60
		{ High	60
	90°	{ Low	46
		{ High	60
	800 yards.		
	Pointed at Source	{ Low	34
		{ High	58
	90°	{ Low	24
		{ High	50
	1200 yards		
	Pointed at Source	{ Low	22
		{ High	36
	90°	{ Low	could not distinguish
		{ High	could not distinguish

2000 yards

Painted at source { Low ^{could not}
High ^{distinguish}

Since this was the limit, did not try 90°.

This test not thoroughly satisfactory because boat was rocking badly & noisy.

Reason was she was anchored broadside to the wind and waves.

1113

4/19/17

Yesterday's results confusing, not reliable. Determined to try out today.

Rained until last night. Started down river in S.W. below but found it rather quiet at Ft. Hancock River. Anchored about 150 yds 11 o'clock from this.

(12) Transmitter # 2

Receiver # 3 with funnel

A = 500

A	Direct	Low	60
		High	60
	90°	Low	54
		High	60

B = 1000

Direct	Low	52
	High	60
90°	Low	44
	High	60

$$C = 1500$$

Direct { Low
High
90° { Low
High

54
60
44
60

Can hear launch engine at this distance.

$$D = 7000$$

Direct { Low
High
90° { Low
High

36
58
36
56

$$E = \text{Heavy Landing machine } 9 \text{ feet}$$

Direct { Low
High
90° { Low
High

24
46
24
50

$$F =$$

Direct { Low
High
90° { Low
High

can not distinguish
at all.

Test for difference with funnel.
Transmitter #1.
Receiver #3 - without funnel.

(43)

A = 500 yds
Low

26

B = 1000
Low

10

C = 1300 yds
Low

2. Limit

Put funnel on.

C = 1300
Low

4

Very much more noisy.
Side running strong now makes
low noise. I think this
figure is correct however.

To confirm previous

Transmitter #1

Receiv #3 with funnel.

A = 500 yds
Low

16

B = 1000 yds (less than A)
Low

14

C = 1500 yds
Low Limit

12

Funnel off

C = 1500 yds
Low

2

B = 1000 yds (less than A)
Low

12

A = 500 yds
Low

12

4/20/17-

Assembled small dinner
bell (Transmitter #4) for
short distance use.

Ran to Sandyhook to take
readings.

Saw Capt. Bettison who
referred me to Capt. Berry
about position for making
deep water tests outside
hook.

Got message from Drvin to
come back to Red Bank
immediately.

Message at Red Bank.
Father unconscious & very low.

4/18/17.

Returned last night from
Montgomery to Orange & got
to Red Bank this morning.
Saw Dawson Taylor, found
that Triped had been finished,
went out to try it out.

Weather Fair. Fair wind from
N.W. Rather heavy swells in bay.

Used -

Transmitter #2 - F¹ Bee
Receiver #3 with funnel, mounted
on tripod, Rungled to bottom about
50 yards from launch.

Readings

(H₁) A = 600 yards.

Low 60

High 60

Stand Launch on low easily to B.

B = 1200 yds

Low 60

High 60

Heard our tender to position C.
High powered motor boats came
by. Could hear to about 1500 yds
at right angles to horn.

C = 1300 yards.

Low 56

High 60

Tramp Steamer came in from
Ocean. Could hear engines easily
to 4000 yards. They gave the
sound - - - - -

D = 3000 yards.

Mistake in signals and
constant interference by
a tug, two paddle wheel
Steamers and a power sail
boat made this reading
impossible.

We have two difficulties
to contend with & need to overcome

- ① means of finding true
distance or range.
- ② need of apparatus & method
of signalling for 3000 yds. or more.

- NOTE -

Discrepancies between Dawson readings and mine may be because of use of different bells. Dawson took angle and effect of funnel readings with #4 small dinner bell. I took readings with #2 large bell.

It is also evident that for quantitative readings, the sensitiveness of apparatus is largely influenced by the current flowing through the filament. We have not been careful in the past of this.

4/30/17

Weather - Calm, blustering, high wind from S.E. - Boat rocks. Could not use horn from boom in such weather.

Transmitter #2 (E^o Bell)
Receiver #3 with funnel, anchored 50 yds from boat on tripod

(45) A = Low 60
High 60

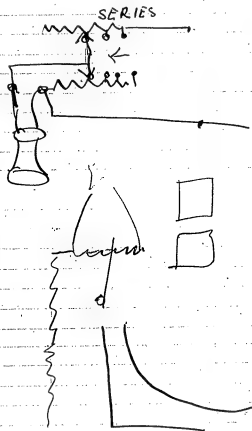
I can not hear launch at position B today though I could Saturday.

B = { Low 28
High 48

Chaw-a-tug - also Borden High powered boat. Disturbs readings.



RECEIVER - SHUNT



Bomb dropping test indicated
so much decided to move up
lay opposite points.

Transmitter #1 (See since B⁷)
Receiver #2 with funnel - from boom

(46)	A		
	Straight	Low	24
		High	46
		Low	14
	90°	High	52

		Repeated above	
	Straight	Low	26
		High	54
		Low	26
	90°	High	46

Dawson Redington same.

Straight { Low 38
High 40

90° { Low 18 (24)
High 36

Took second time

Straight { Low 38
High 54

90° { Low 26
High 50

Then tried effect with &
~~without~~ funnel -

(47) 1500 yards
Transmitter #1 (RT Rec)
Receiver #3.

With funnel hear to
Low 32
High 52

Without funnel hear to
Low 14
High 34

Order from Orange

4 Hard Rubber Blocks
having 2 Falnstock connectors
each.

1 box each size double
pointed tacks

Suggestions & Notes on Apparatus

- ① Trouble from water in back of diaphragm largely if not entirely removed by new large tube at bottom and small orifice above.
Suggest that this tube be well vaselined to prevent capillary.
- ② Suggest that all parts be well vaselined in sending out, especially iron or steel. This will prevent rust and water staying in.
- ③ Suggest large bush with thin rubber diaphragm to prevent water getting in back of diaphragm and at the same time equalize the pressure.

A	B	C	D	E
1	2	Repeat 3	4	5
F	G	H	I	J
6	7	8	9	0
K	L	M	N	O
P	Q	R	S	T
U	V	W	X	Y
Z	Num	Interval		
	X	X		
Sending				

A	B	C	D	E
1	2	3	4	5
F	G	H	I	J
6	7	8	9	0
K	L	M	N	O
P	Q	R	S	T
U	V	W	X	Y
Z	Num	Interval		
	X	X		
Receiving				

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments -- A. M. Kennedy Books
Notebook, N-17-04-01**

This notebook was used by Absalom M. Kennedy in May and August 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The entries from May relate to the procurement of a boat at Cold Spring Harbor, Long Island, setting it up for experimental work at Sandy Hook, New Jersey, and performing receiver and transmitter experiments. The entries from August pertain to experiments on the submarine detector. Included are details of trips to Sag Harbor, Long Island, to listen to torpedoes being fired at Bliss Proving Ground and other locations. The Bliss entries bear brief notations by Edison. The notes indicate that Jerry T. Chesler, E. Rowland Dawson, John A. Hanley, and Sherwood T. (Sam) Moore also worked on these experiments. The front cover is labeled "Experiments. #4. From May 1 to 1917." The pages are unnumbered. Approximately 110 pages have been used.

May 1, 1917.

Weather - Raining. High sun,
blowing gale.

Ran down to Highlands. Found
wind as high and as engine
was skipping, ran back to
Red Bank, agreeing to pay Andy
\$8.33 for day.

- ① Had Taylor fix #4 transmitter.
(Small Dinner Bee) with heavy
gravity clepper.
- ② Tested storage batteries, showing
Dawson method and results.
Found one discharged.
- ③ Tested lead covered cable as
input against regular
rubber covered wire. Found
no difference.
- ④ Made arrangements with
Drum to store extra material
and for use of leather and

bench.

- ⑤ Next over audions and showed Danson effects of amount of filament current.

May 2, 1917.

Beautiful clear morning.

- ① Had Andy run tender off dock to get photographs of waves. Sun low & in good position but am afraid that the other (wind) waves interfere.

River very calm at Highlands. On entering bay, met by strong N.W. gale, throwing up heavily sea with white caps.

Anchored off breakwater. Wind increased. Started back up river to get readings.

Found water calm though high tide running between Highlands and mouth of Hauesink River. Anchored to by effect of diaphragm.

As this tide would interfere with boom work, decided to try experiments with different thicknesses of diaphragms.

First tried using #3 Transmitter with horn from boom. Tide made this so noisy decided it was impractical.

Then tried mounting #3 Transmitter with horn on tripod. Noise proved intermittent, at times perfectly quiet and then noisy.

Started out to find source of noise and located in ropes and cables touching or hitting the funnel.

With care to avoid this the transmitter was quiet.

Being at anchor between Bridge to Highlands and the mouth of the Navesink River, about 700 yds from mouth made tests of diaphragms.

(48) Transmitter #4
 (Small Denny Reel)
 Receiver #3 with horn, on
 tripod.
 Distance 300 yards

.010" diaphragm { Low 18
 High 34

.020" diaphragm { Low 28
 High 50

.032" diaphragm { Low 24
 High 38

Steamers came by and as the
 channel here is narrow, we
 had to move out of the way.
 Came up to Red Bank and
 repeated experiment

Distance 100 yards

.032" diaphragm
 .020" "
 .010" "

Low
 8
 26
 12

May 3, 1917.

Weather. Fair, High West Wind.
 Ran to Highlands to take
 diaphragm thickness
 readings.

Launched #3 Resum from boom.

(49)

	mm	Row	High
.010	none	16	38
.015"	48	24	50
.020"	42	42	60
.025"	30	32	48
.032"	46	28	40
.040"	24	12	26
.063"	22	12	20

May 11, 1917.

Weather - Morning - fair -
high N.W. winds
Afternoon - cloudy.
wind moderated some.

On account of high wind, went
to Highlands to take readings.

On first arrival, tide was so
swift as to make noises
too great for readings.

Got reliable readings on turn
of tide, about 12:30 P.M.

Found A battery low
voltage and on test found

1 cell 1.25 V.	4 cells 4.80	7 cells 3.80
2 cells 2.50	5 " 4.50	8 " 4.90
3 " 3.75	6 " 4.20	9 " 5.80
		10 " 6.60

proving that cells 5, 6, & 7 were
reversed.

Cut these out and with cells
1, 2, 3, 4, 8, 9, 10 in circuit got 9
volts.

During turn of tide made
tests of mica diaphragms
with iron centers against
standard Bell diaphragms.

(50)

Transmitter #4 (Quartz Drive Bell)
Receiver #2 (Bell receiver with Tube)
Distance about 100 yards.

A Regular Bell Diaphragm.
Tied to 52

B Mica Diaphragm .005 thick,
with iron disc $\frac{3}{4}$ " diam x .005"
on center. Disc on opposite
side of diaphragm from
magnets.
Tied to 60

C Attempted to reverse so that
disc would be on magnet
side of diaphragm but
disc pulled away from
diaphragm.

C = Mica diaphragm .0055"
thick. Iron disc .013" x $\frac{3}{4}$ ".
Disc on opposite side
of diaphragm from
magneto.
I tried to

54.

Attempted to take reading
with disc on same side
of diaphragm as magneto.
The magneto seized the
disc.

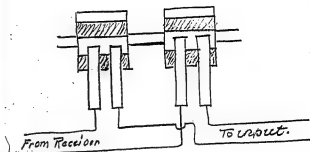
D = Mica diaphragm .011" thick
with soft iron disc .005"
thick x $\frac{3}{4}$ " diameter.
Disc on opposite side of
diaphragm from magneto.
I tried to

20

By this time the tide had
turned and was running so
swiftly as to make reading
impossible from noise
made with receivers.

Tried out new break wheel
to see if less noisy than
former.

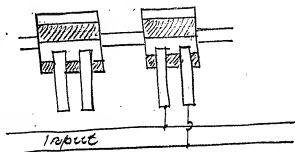
1st connected in usual
manner.



Found loud ringing periodic
note, whose pitch was not
varied by changing speed
of motor.

Found that when brushes
were left on insulated bar,
that is when input was
open had same ringing
noise when motor was
stopped.

Changed to following
connection so that inputs
would not be open —



Break still noisy but now
the pitch of noise varied with
speed of the motor.

This noise is too great
to permit break being used
in input circuits.

5/5/17.

Arrived Cold Spring Harbor about 10 o'clock.

Spencer had told Nelson to call him up at 11 am. Called up and reported clutch trouble.

Decided to take Engineers from Cold Spring Harbor to run engine until we got through Hell Gate and into the Upper Bay.

Left about noon.

Had difficulty with clutch in getting away. If the reverse was adjusted tight enough to hold the forward would bind.

Finally adjusted so that the reverse was loose. Went until off Matinecock Point when engine began showing trouble which continued until we got off Right House at Execution Rocks. Here she stopped dead and we had to anchor to avoid being blown on the rocks. (N.W. Wind).

After almost an hour's work

Finally get off here. Tried to
make City Island. Engine has,
stopping repeatedly. Finally
refusing to run at all. About
8 PM, anchored 500 or 600 yds
due S. of Sleeping Stones
light in heavy blow and
heavy sea.

Nelson and Engineer examined
engine and found water in
#3, 2, 3 & 4 cylinders.

Determined to run to
City Island, mess yard, in
morning get new dry batteries
and get in communication.

If engine makes O.K. try and
pull on through to Highlands. If
engine shows up bad, phone
Spencer & have her fixed up
at City Island.

22 6/10/17

5/16/17.

Got engine straightened out and ran for City Island. Got 6 dry cells and sent telegram to Mr. Meadmore ft. r. Dawson and telephoned Mr. Spencer's office.

Ran OK until we got past alone Manhattan Bridge. Picked out and had to tie to a barge at Pier #40.

Found Spark Plug dirty. Cleaned them. Got away about noon.

By compass laid course about 5 degrees east of South and made Sandy Hook point without trouble.

Stopped half way up the bay to clean spark plug. Engine skipped and stopped half a dozen times, just getting us through the bridge at Highlands.

Tide carried us to mouth of Naubank River.

In trying to start engine, she back fired, and sheared

the key holding the starting
rackets

Rowed to Highlands and
telephoned Drumm to send
Andy and launch to tow us
in. We arrived about 9:15
and towed us to Res-Bank
by 10:30.

5/17/17.

Went in to see Irwin. Spencer had telephoned him to repair engine and clutch.

Got Dawson aboard. Discussed location of pound boat. Decided to use the small state room for the purpose. Measured this and Dawson sketched out berth to fit. Went him on to Orange to cut it out.

Got Irwin aboard to examine engine. He reported cylinder rings leaking, valves leaking, clutch dog bent, ignition system poor, exhaust pipe needs replacement. Telephoned Buffalo Engine people who could not send man. Telephoned Spencer who will come down tomorrow. Telephoned Dry Dock to arrange to take her out.

Towed boat to dock. Planned to buy tripod to lift engines and have them out.

for repair tomorrow.

5/18/19.

Inuin & Andy early on job. Hot engines disconnected from oil pipes etc. and with frame & chain block hoisted up on deck. Found valves seated poorly. Little or no knock in bearings. Piston rings in good shape.

Spencer came about 1 P.M. and agreed to the work being done. Also agreed to sending her to Keyport to be hauled out and painted.

Left Dawson with host and went to Orange to see about Roth and about small germinating plants for charging the storage batteries.

5/19/17.

Found trouble with under-water
box at Orange, top and sides
warped so that the mumsaws and
top plate could not be fastened.
Let Ford Truck and sent it
with Taylor to McCabe Co.
manufacturers to have straightened
out.

Went over to Storage Battery
to Navy Lighting Dept. Found
that they had a small generating
set (Globe) which would fit
our purpose. They offered to loan
it to us but Mr. T. did buy it.
Asked them to express it to Red
Bank to arrive Tuesday or
Wednesday.

Grom Mudd found that parts
of Boat moved he shipped
Monday and that Jeff and the
carpenters would be down
Tuesday to put it together and
on boat Wednesday.

Got back to Red Bank in
afternoon.

5/20/17.

Got Kingland on board to work on engine.

Andy started towing us to Keyport to be hauled out about 10:30 a.m.

Got along O.K. until between Point Comfort and Favelard, we ran aground. Got off in about 30 minutes.

Ran into rain storm between Point Comfort and Conesport Point. Lasted only about 15 minutes.

Got to Keyport and anchored about 4:30 P.M.

Aeroplane started out from school. Failed about 5 miles and dropped in sea. Was towed in.

Ferry reports can not haul us out until Tuesday morning as he has the Oikling on ways which will not be off until that time.

5/21/17. - Monday

Went to Orange this morning. Found that Taylor had not got the iron box from McCabe but that he was going to inspect and see if ok. in afternoon.

Had to get bottle of storage battery solution. Had to get car to catch 4:54 train. Ray just got bottle to me as I was stepping on car.

On arrival at Keyport, found that Drinn had been telephoning about material which had arrived.

5/22/17

Went to Red Bank to see Druein about material. Found the saw-hair felt and lumber for both there.

On arrival back at Keyport found that in drawing boat up on ways the rollers slipped off to port side so that the boat was jammed and when tide ran out could not go up or down.

Telephoned Mr. Spenser, Mr. Meadowcroft and to Druein.

Terry was apparently at sea and did not know what to do.

Druein came down about 2 P.M. Decided to draw her off at next high tide (about 9 P.M.) by reversing the ways and by line from bow to a large barge. Prepare ways tomorrow and pull her on again Thursday morning. In this way she will not get off again until Saturday morning.

Also planned with Druein to send felt and lumber over by

truck so that Mudd's men may
work on hoath while boat is
on ways and enroute to Newark.

Dawson went to Orange in afternoon.
Captain notified me this
morning that he requested quit
~~that night~~, saying that he saw
the boat was going to give
trouble and he wanted to get
away from it.

Spotted with him as follows:

11 days wages @ 100 ⁰⁰ per mo	36.67
Advanced John	3.95
Advanced Cook	1.50
Telephone to Spencer	.35
	<u>\$42.47</u>

Quit following information from him:

Name - Chas. A. Wilson
Address - 634 Lexington Ave, N.Y.C.
Age - 39
Nationality - Danish.
1st Papers - About 6 yrs ago
2nd Papers - not yet out.

I am glad that he quit.
Believe he is a good navigator

but he thought much more of
the dignity of his job than of
the work.

Jerry got Yankee III. Heated
about 8:45 P.M. Feed him alongside
dock for the night.

5/23/7.

As sloop was coming in to ways close to us, anchored Yankee III off dock.

Cook did not return last night. Suspect he will quit with the Captain.

Saw Perry about pulling Yankee III out again. He planned examining his ways today at low tide, and fixing them tomorrow and hauling us out tomorrow night. Got Dravin on phone who got Perry to hurry up and pull us out tomorrow morning. Arranged with Jim to bring the tender down tomorrow morning. Hope the weather is good so he can make it all right.

Roseland having trouble pulling off the fly wheel. Says he started it but she does not come farther.

Terry now tells me that he can
not haul until tomorrow night,
that he must float his sleds
and get them on the tracks on
high water tonight. Power them
a place on low tide tomorrow
and pull us out at high tide
tomorrow night.

Spencer came and saw boat
that she was not damaged. Got
him to go back by Red Bank to
Bush Drum, up.

Talked to Kingsland about
Captains job. Spencer will go
to Newark with us and if
satisfied with Kingsland will
take him at \$100 per month.
Telephoned Mudd about the
carpenters. Promised to send them
down tomorrow morning.

2

5/24/17.

Trouble with pulling off fly wheel. Broke puller. Went over to Tilton & Cherry - wagon works to have them make new one. They loaned me one which was little too small. Had them make attachment so it would draw wheel from two holes already in it.

Telephoned Durin. He could not come over this morning, but would try this afternoon. 1 P.M. Carpenters have not yet arrived.

1:30 P.M. Carpenters arrived. Began work on bench.

Saw Terry who tells me that he can not pull out at night.

Got fly wheel off O.K. Pulled key with it and stuck the whole way.

Telephoned Durin size of key $1\frac{1}{2}$ x $1\frac{1}{2}$ x $5\frac{1}{2}$ to have new one made.

5/5/17.

Drum came over early - 6 am.

Got fly wheel on with starting

Washed pump & key.

Revised engine.

Brought over spare perfect plug.

Got engine started.

Adjusted clutch so that would

lock forward and backward.

Bound slightly on back however

and had to loosen up.

Derry will not haul us on

apparently high N.W. wind.

Told Drum that unless we could

go to Newark Sunday morning,

he could not haul us at all.

Kingsland wants 3/8 x 1/2 bottoming

tap and reamer. Could not find

in Keyport (4 stores). Spent twice

to telephone Drum for it but he

did not answer phone.

Got 3 wet Ambison & Batteries

aboard from Andy's boat.

Went to Orange to get bottoming

tap & money and ideas beginning

to run photo.

New transmitter not finished.
"miniature Submarine" not finished

5/26/17.

Caught early train (8:27) back. Saw Perry who could not promise to get us off ways before Tuesday or Wednesday if we went on. Told him we could not go on as we had to get off Sunday. He promised to hold ways for us on notice any time we could come back.

Telephoned Drumm several times about clutch. Had band made to go around & draw up on it to prevent breaks & spreading. Just too full to clear housing.

Telephoned Standard Oil Co at Matawan for gasoline.

Could not tell when it would come. At last, about 11:30 telephoned and it had not started yet. Cancelled and after trying garage, finally by hauling in trailer, for saw, finally got from Kipp's Yacht Club.

Pipe, oil shipping from Drumm's arrived about 8:30 PM. so we

hauled out to anchor ready to
get away in the morning.

Spencer came at noon. Saw
situation. Packed with Drumm and
phone.

Determined to head to plan to
make Newark by leaving early
Sunday morning to take study of
beach along for safety.

cu

5/27/17.

Up early. Got away from
Keyport 8-8:30. Engine blew
out gaskets in about a mile and
Andy took us in tow alongside.

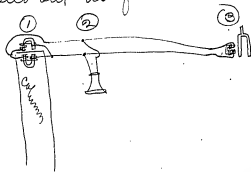
Got engine running again but
blew out another gasket.

Made across the Raritan Bay
and up Arthur Kill on tow
O.K. Past 3 bridges. Ran
around just before Hts.
Got engine going to pull out.
Long waits at Turnpike & P.R.R.
bridges.

8/4/17.

Amely brought down and set up resonance column.

Tested out as follows



- 1 = Resonant Receiver (Regular Diaphragm)
- 2 = Bell Receiver to compare with column
- 3 = Mesquite phone 290 fork & watch case receiver, fork tapped by hand.

①
Tested Column against Bell Receiver and adjusted until when tuned to 23.6 (in column) the sound of fork could not be heard in receiver and could be distinctly heard in ear tubes. Proving OK.

8/4/17

(2)

Then replaced #3 with receiver #3 and used B⁷ Bell (#2) as transmitter.

Could be heard distinctly in (2) Bell Phone but could not be tuned for and heard in tube.

(3)

Same as #2 but used E⁶ Bell Transmitter #2 in place of B⁷ Bell.

Could tune for in tube and hear at 14.5 very faintly. Could hear loud in Bell Telephone (2).

(4)

Replaced (3) Receiver #3 with Bell Telephone and placed 8" from E⁶ Bell IV. A/R.

Could be heard plainly in Bell Telephone.

Could hear note faintly at 24.6
By tuning could hear taps of clapper at 12-18-24-36.

Reason that fork could be heard better than bell probably because the fork gives a pure musical note while a bell gives a stroke with a series of non multiple overtones and can not be tuned for as readily.

Now we knew what a submarine really sounded like - whether the gyroscope - the commutator - shaft vibration or the propeller made the most noise so that we could go after the right one and try and get it.

8/5/17.

Sunday.

Hardy went to Orange last night to get adapter ring to fit large, movable coil receiver to resonance tube and returned this afternoon.

The mice go out in Bay tomorrow and try out.

8/6/17.

Got provisions & ice aboard.

Ran out in Bay and anchored
about 1 mile due east of
Sandy Hook light. Position
indicated by Mr. Edison
when down.

Rigged up the crab to anchor
horn on bottom so as to
avoid rope sounds.

Weather overcast. Slight breeze
from S. E. Increasing.

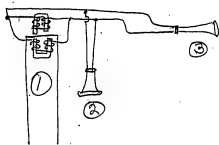
Preliminary

1. Tested out resonance tube with
tuning fork O.K.
2. Tested horn circuit to tube
with E⁺ Bell. Could not tune
for. (Confirms previous experim^{ing})
3. Used 290° fork, touching horn (17)

8/6/17

to test horn circuit. Proved OK
and even tuned to 23.6 lower
than Bell Telephone.

Used Bost with top off. No
Bost noises interfere.



1 = Resonance tube with balanced
receivers

2 = Bell Receiver

3 = Horn Receiver #3

Transmitter = Bell E^b #2.

(5)

Unshored #3 about 30 yds from
Pumpant
Sounded Transmitter #3 about
30 yds away. Could not hear

1-2) 45.5
98.0

28

46.2
10.2
14.2
16.5

either with receiver #7 or
with column #1.

(6)

Battery OK - 1.3 amp
130 volts

Above experiment being a failure
connected up audions. With
Beel at about 100 yds could hear
on J.

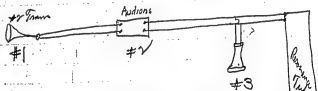
Low to 26
High to 38

This is low sensitivity and
the audions show too much
crackle noise. Will have to
be looked after.

Washed up or blowing white caps

(7)

then connected the resonance tube
with audions, as shown



Resonance tube with
balanced diaphragm.

Used E^b Bell as transmitter.
Could hear to 32-38 with
audions and receivers.
Could not distinguish with resonance
tube at any tuning.
The popping & crackling noises
which were prominent in
receiver were more prominent
in resonance tube and could not
be tuned out.

(8)

Tested to find whether these
crackles were in audions or
in input circuit. Found that
audions worked OK and crackles
were in input circuit.

(9)

Used Bell Receiver in place of
#1 and tested resonance tube
against receiver, used for
tuning fork to excite.

Sound louder in tube than in
receiver but could not be tuned
out. Slightly louder at 13.6 - 20.5

and 26. - This seems to show
~~that the tube can tune out~~
low sounds but not those
amplified by the audions.

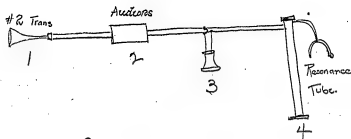
Took in Receiver #7 and found
one wire broken.

This accounts for crackles
and for lack of sensitiveness

3/7/17.

Weather beautiful. Slight breeze making just a ripple on the sea.

As results yesterday were false, due to broken wires from receiver to input, duplicated these experiments to make exact.



Used Balanced Diaphragm on resonance tube

Used E^b Bell (#2 Transmitter) for signals. Anchored this about 30 yds from boat on tripod.

Distance ⑩ 100 yards. Could hear
with audions

Low

60

High

60

Audions working fine. On account
of smooth feed, very little
noise - no crackles as yesterday.
Seems as sensitive as on first
tests.

⑪
Then listened in with resonance
tube H. Found note as loud
as with reed.

Tried tuning out sound and
could not. Practically as
loud at all lengths of air
column. Sound of bell just
a little clearer at 22. Which
about corresponds to fundamental
note of bell.

⑫
Distance 600 yards

Low

to

60

High

to

60

(13)

Could hear at all points on resonance tube. Could not tune out. Trough cleared at 22.

(14)

Distance 1000 yards.
Readings not clear on account of boats running around. Two government boats and about a dozen small fishing launches churning around. Boat also swaying and tightening up on lead line and made noisy.

Had to get train for Orange so left at 4:30.

Seeing boats running around Stanley landed he turned out bell once but not sure.

Will go out in middle of bay where fewer boats are on next attempt.

8/8/17.

Orders from Mr. E to proceed to
Jagg Harbor. Telegraphed Dawson
at 9 am to get water, gasoline &
provisions on board. Took Hall
train. Telegram not delivered until
after my arrival about 1:20.

Got on gasoline, Lee, provisions
left at P.M.

This morning Dawson & Stanley
had water & charged batteries.

8/9/17.

Got away from Gravesend Bay at 4:00 am. Baked tide to reach Gate. Water here remarkably quiet probably because almost dead low tide.

Ran well to New Haven. Got in about 5 PM. Timed speed of boat at Execution Rocks. Just under 8 knots per hour.

Went to Naval Base at New London to find about gasoline. Informed that could not get any there but could at second slip "this side" of bridge. Could not locate this slip but was directed to Standard Oil dock on other side of bridge.

Steering cable overlapped on drum and had some trouble getting to dock. Then more trouble getting gas. Took on 50 gal. & ambled outside for night.

8/10/17.

Engine hard to start. Got away at 8:20 am.

Sea a little rougher than previous day - cross red with white caps.

Made nets about 9:40. Patrol boat directed us through between "red and white buoys" as I understood though he probably said "red & white gas buoys".

Sun was directly in front so as there were white buoys to port we ran between red gas buoy & white buoy. Second guard ship called us down for not running between red & white gas buoys which were very plain from his side, with the sun but we did not see against the sun.

Made Pag Harbor about 1 P.M. Went to Station & telegraphed and got information about (Sisco Co)
CHS

Found Mr. Pleasant at Bliss
Co. who extended every courtesy.
Informed Orange that we had established
base.

Met Mr. Miseraw who first
said probably would have no
torpedoes left to fire but
on telephoning found 6 were
coming and would be fired.

Arranged to test tomorrow
and listen in on their firing.

8/11/17.

Up at 6. Saw Triceratops who
said he would give us pilot
out to ~~testing grounds~~ in time
to get there & set up. Left
Sag Harbor, about 9:00. Set
to 1st secw on course,
4000 yds from firing point
and angled 300 yds to right.

200 yds 4000 yds

These distances
accurately
determined
by secw and
by stakes.

net.

Put out #2 Reemew on tripod
in 30 ft water as the sea
was quite rough with occasional
white caps.

(15)

Test to hear Torpedo on
Bliss Co. proving grounds.

Reemew #2 (Beel phone with horn)
on tripod in 30 ft of water
pointed at right angles to
course of torpedo, 4600 yds
from firing point, 200 yds
off course.

Heard the 1st Torpedo plainly
and from evidence, the whole
length of course. It sounds
more like a car running
around a curve than any
thing I know. There is not
a single note but a lot of
series of notes mixed together.
If one is more prominent than
the others, it seems to be
A = 435 N for seconds. Reemew
northwest

Note. Launches running
after torpedo mask the
sound.
Must try and get tests
where launches are a
greater distance away.

Found part of noise from input
wire on coil needs a battery
which may have been passing.
Believe we should run this input
the whole way in lead covered
cable. Will need special reel
to hold this.
Have one made in Lab

(Torpedo stopped)

2nd Torpedo. Did not hear
when they said it was fired
but heard a series of
crashes & bangs like explosions.
Then heard it later but not
plain & heard a launch with
it. Heard it only a little
time when it stopped short.

3rd Torpedo - Could hear only
when passing. Then very loud
estimate heard only about
2000 yards on either side of
horn.

Found batteries low - incapable
of giving 1.8 amp. to 1st
audion ball audions low.

2 launches at 200-500
yards. Chased torpedo for
awhile.

4th Torpedo. New Batteries on.

Audions. Somewhat noisy -
some crashes.

1 min 45 sec after firing - first heard.

3 min. Very loud. High pitched
distinctive note.

3 min	40 sec	- permed loudest.
4 "	30 "	loud, diminished
5 "	00 "	loud, plain
5 "	30 "	hear
6 "	00 "	still hear.
6 "	40 "	& different noise hear launches plainer than torpedo
7 min	30 sec	hear launches only
8 "	"	" " "
9 "	"	" " "
10 "	"	" " "

Then changed output around to
pair of head receivers on deck
~~so that~~ could see and hear
too.

Lantern went by. Could
hear plainly for 1500 yds at
right angles to horn.

1000 yds.
2000 yds.
3000 yds.
4000 yds.
Missed
Commiss
Reents

4:00
7:00
10:10
12:57

Note

Three torpedoes are fired
for test with 60* air under
service conditions are fired
with 700* air. Hence the
difference in velocity to
4000 yds and to 12,500 yds.

Naval Lt. Gave following data on
shots of Saturday 4th

4000 yds	4:05	4000 yds	4:04
7000 "	6:58	7000 "	7:02
10000 "	10:07	10000 "	10:00
12500	13:42	12500	12:58

8/13/17.

Missed 5:25 P.M. train yesterday
and left op. 5:15 this morning
arriving about 9:20.

Started saw Picants of Bliss Co
who stated they were testing
torpedoes

Naval Lieutenant (did not get
name, Jr. grade, Ordnance Dept.)
warned me to be careful of
two Japanese on the Hume
East Longlades, anchored
at dock. They were suspected
of being Japanese Naval Officers.

Started for testing grounds
soon as possible. Arrived
11:50 at tug.

Next aboard. Found they would
fire until 4:30 P.M.

Order
500 yds #18 & #19 Red & Black
Rubber covered wire. Jerry can
burnish sample. Express care.
E. M. Bliss Company.

- Write Mr. E
- ① Launching pressure here & better
conditions
 - ② Red in wires shorted.
 - ③ Range Difference.
 - ④ Trouble with audion circuit in
addition to lead in wires.

Act. Tape

⑩
Launched #2 Rescuers. On test
proved defective. Could not
hear a torpedo which had
been fired, a launch or a bell.

Took in and tested out & found
short circuited and that this
short circuit was in the
lead in wire.

This caused us to miss torpedoes
#3, 8, 9, 10, 11, 12, which were
fired.

Took off #2 transmitter. Some
moisture around tape on top but
Charleston compound seems intact
and seems to have protected joint.
Connected up new transmitter (for wire).
Audion circuit very noisy even
when short circuited.

So late we will have to go in and
telegraph. Not fast tomorrow and
get ready for torpedoes.

8/14/17.

Left 5:45 for testing ground to get ready.

Packed out .002 wire transmitter on tripod. Tested with bell. Could hear right away but could not hear at 500 yds. Circuit very noisy.

Looked at circuit over. Found two loose connections, one on A battery, the other at B. battery switch.

Then tested out. Circuit quiet on disconnecting transmitter & substituting Bell Receiver. Circuit quiet on testing with new .002 wire receiver out on tripod.

Tested with #2 (E's Bell). Could hear to 60 at 100 yds. Could not hear at 700 yds at all.

$$\begin{array}{r} 14.2 \\ 0.15 \overline{) 14.700} \quad (280 \\ \underline{30} \\ 1700 \end{array}$$

$$\begin{array}{r} 0.48 \overline{) 13.700} \quad (285 \\ \underline{96} \\ 4100 \\ \underline{3680} \\ 420 \end{array}$$

Then disconnected underwater receiver & connected Bee receiver. Audion circuit seems sensitive. Clock 8 ft away very loud on low.

Measured resistance under water receiver. Bridge returned to Lab so had to use ammeter-voltmeter method.

$$\text{Current } 13.7 \text{ volts} - .08 \text{ amp} \\ = .181 \text{ ohms.}$$

$$\begin{array}{l} \text{Measured \#1 receiver out of} \\ \text{water} \\ = 4.2 \text{ volts} - .050 \text{ amp} \\ = 84 \text{ ohms.} \end{array}$$

Then again measured resistance of new receiver, which had been withdrawn from water and wire allowed to dry.

$$\begin{array}{rcl} .015 \text{ amp } 4.2 \text{ volts} & = & 280 \text{ ohms} \\ .048 \text{ amp } 13.7 \text{ " } & = & 285 \text{ " } \end{array}$$

$$\begin{array}{r} .856 \text{) } 3.7 \\ \underline{116} \\ 210 \\ \underline{174} \\ 360 \end{array} \quad \begin{array}{l} (136 \\ 65 \end{array}$$

$$\begin{array}{r} 06 \ 65 \text{) } 137 \\ \underline{130} \\ 700 \\ 6550 \end{array} \quad \begin{array}{l} (211 \\ 65 \end{array}$$

$$\begin{array}{r} .178 \text{) } 14.80 \\ \underline{136} \\ 90 \end{array} \quad \begin{array}{l} (85.00 \\ 90 \end{array}$$

2501
2024/1/100
211
8500

8727/8

Again hit new resistor & wire into water.

Reeking ① .058 amp 13.7 volts = 286 ohms
" ② .065 " 13.7 volts = 211 ohms
" ③ .070 " 13.7 " = 196 "
" ④ .090 " 13.7 " = 154 "
" ⑤ .100 " 13.8 " = 137 "

Then left during lunch.

" ⑥ .000 13.7 " = ∞ "
This means that the circuit is open somewhere and has been leaking.

Cut wire loose from receiver.

Wire showed continuous continuity but test under water showed break down of red lead - that is that the red lead was grounded.

Test of receiver alone showed 150 ohms resistance.

Probed on to where the break was.

Then tested out lead covered wire as this is the only continuous good wire we now have.

This tested O.K. in continuity and no grounds.

Connected lead covered wire to receiver. Circuit showed OPEN.

Disconnected lead covered wire from receiver. Wire circuit O.K. Receiver circuit OPEN.

It is evident that an intermittent open circuit in this receiver has been deceiving us all day.

Then used #2 Receiver in place of new receiver. Wired temporary to lead covered wire. Tests out O.K. Wired permanently with water proof joints. Tests O.K.

No torpedo tests made today by Bliss Co.

8/15/17.

New course in Noyack Bay.
In this course the torpedo is fired at
right angles to course, has to turn
and make course.

(17)

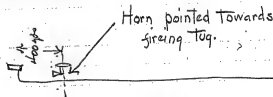
Set out #2 screen on tripod at
400 yards.

Had no time to test as they
were ready to fire.

Heard torpedo immediately it
struck water unmistakably.

Men off horn could not stand
tutors to ears. Deafening.

Could hear about 15 minutes.
Launches interfered.



400 yds

circle

these are special torpedoes which leave very little wake.

We could not see them more than 300 or 400 yds away.

Wake of ordinary torpedo due to smoke of superheat of air.

NEED - BETTER LEAD IN CABLE.
and reel to handle.

Also better tripod and means of launching.

Went in to tug to see Mirawal
He promised to keep launch
from running while torpedo
was running.

Staked off accurately 1000, 2000,
3000 yds. Range buoys for us.

Found from him that the two
propellers on the torpedoes run
at two different speeds. Hence
the screech of not one but
two musical notes before
recorded.

(18)
Range 400 yards.
Heard torpedo instant struck
water.
Could hear 1 min 25 sec above
other noises - which were
coming from tug.

these are special torpedoes which leave very little wake.

We could not see them more than 300 or 400 yds away.

Wake of ordinary torpedoes due to smoke of superheat of air.

NEED - BETTER LEAD IN CABLE.
and reel to handle.

Also better tripod and means of launching.

Went in to tug to see Mineau.

He promised to keep launches from running while torpedo was running.

Started off accurately 1000, 2000, 3000 yds. Range buoys for us.

Found from him that the two propellers on the torpedoes run at two different speeds. Hence the screech of not one but two musical notes before recorded.

Range 400 yards. (18)
Heard torpedo instant struck water.
Could hear 1 min 25 sec above other noises - which were coming from tug.

They fired a small torpedo
here before we were ready.
Absolutely invisible.

Moved to 1000 yards. (19) (accurate)

Heard 1 second

Soundst 1 min 10 sec.

Heard N = 30 sec

Made 4000 yds in 4 min 45 sec

No torpedoes running.
No. 19.

Only none of strikes
some white caps.

(20)

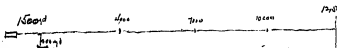
Range 1000 yards. (accurate)
Wind Rising. Sea getting Rough. Numerous
White Caps.

Signalled all boats in. Before
we got tripod set again, fired
last shot for day

Start next Report

8/16/17.

On Gardiners Bay Range. (Long Range)
Anchored at estimated 1500 yds
from firing tug, 200 yds off
course.



Used #2 Reimer on Tripod. Horn
pointed at firing tug. Lead covered
input wire.

This is too short and does
not lie on bottom.

(21)

Second shot of day. Not quite
ready. I heard ^{at 1000 yds} shot and thought
I heard about 500 yds first 4000 yds
seen.

(22)

Same conditions as 21 but I did
not know when shot was fired
and yelled Dawson when I
heard who took time interval

(073)

Missed 3d shot. Cable got
tight due to not enough lead
lowered cable & led to rest
horn.

Missed 5th Shot
Missing

Time to hear. $2\frac{1}{5}$ seconds
Lowest. 1 min 55 sec
Passed 4000 yds. 4" $25\frac{1}{5}$ sec
Can not hear. 5" 35 "
Passed 7000 yds. 7" 57 "
Passed 10,000 yds.
Passed 12,500 yds.

(23)
Same as 22. as torpedos started.
Launch about 3000 yds away but stopped.
Time to hear $7\frac{1}{2}$ sec
Lowest 1 min 58 sec
4000 yds 4 min 10 $\frac{1}{5}$ sec
Can hear to 5 min 45 sec
7000 yds
10,000 yds 10-32
12,500 yds

(24)
Same as 23 but 2000 yds.
about 400 yds off course
Time to hear $5\frac{1}{5}$ seconds
Lowest 2 min 21 sec
4000 yds 4" 4 "
Stop hearing 6" 35 "
7000 7" 55 $\frac{1}{5}$ -

10,000 -

10 min 10 $\frac{1}{2}$ sec

12,500 -

(no lamnches running)

(25)

Same as 24. Except that
bug started up & made noise so
could not hear torpedo as far

Hear

9 $\frac{1}{5}$ sec

Round

3 min 40 $\frac{4}{5}$ sec

4000 yds

4 "

8 sec

Can't hear

5 "

7 "

(mine of trap)

7000 yds

7 "

5 $\frac{3}{5}$ "

10000 "

10 "

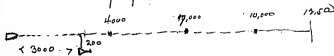
10 $\frac{4}{5}$ "

(26)

~~Same as 25~~

~~Hear~~

8/17/17.



Set up as above same as yesterday using #2 Power with lead covered input. Ranched on trips from boom.

Day threatening - rain, thunder & heavy clouds. Wind in gusts rather than swift & steady.

(26)
Distance 3000 yards

Time to hear	15 sec
Lowest	3 min 0 sec.
4000 yds	4 " 18 "
7000 "	7 " 22 "
10000 "	10 " 37 "

Plash as run to surface or in place at about 3000 yards.

Big & launch running. Could not tell when ceased to hear.

Wide angle. Horn to pick up
from various directions.

(27)

Same as 26
High wind & white caps here

Hear 17 sec.
Lowest 2 min. 57 sec.
4000 yds 3 " 45 sec
Launch started 5 " 55 sec
interrupting when
sound lost

7000 yds 6 min 25 sec.
Could not see 10,000 or 12,500

(28)

Same as (27)
Wind quieted down. A boat, slow
speed engine running.

Hear 25 sec
Lowest 3 min 38 "
4000 yds 3 " 47 "
Launch started 5 " 25
Can't distinguish from launch 6-25
7,000 7-42
10,000 10-53
12,500 13-55

(29)

Same as 28. Torpedo launches
running at first & current
missy prevented early hearing

Hear	37 sec
Foudest	3 min - 15 sec
4000 yds	3 " - 55 "
Can't hear	6 " 29 "
7000 yds	6 " 50 "
10,000 "	10 " 00 "

Torpedo off course - 200 yds at 4000

(30)

Same as 29 but 4000 yds.

Distance	4000 yds
Hear at	1 min 26 sec
Foudest	3 " 50 "
4000	4 " 50 "
Test / hear	5 " 29 "
7000	6 " 05 "
10000	10 " 05 "

Note Against sun impossible to
see wake of torpedo.

(31)

Same as 30
Sea rather quiet. Gentle wind.
Distance 4000 yards.
Heard 1 min 8 sec.
Furthest 4 min
4000 yds 4 " 18 "
Launch started at 400 yds & marked here
7,000 " 7 " 07 "
10,000 " 10 " 07 "
12,500 " 13 " 3 "

~~(30)~~
~~Launch started at 400 yds & marked here~~

8/18/17.
Weather Rough, High Wind,
Rollers and White Caps.

140 yds

Set up beside the torpedo firing boat
in attempt to get distance can
hear torpedo.

Used Rescuer #2 Launches on
tripod, lead covered input cable.

(82)

Wind getting worse.

2 launches running at 7000 + 2000
yds. So much noise that it is
impossible to distinguish torpedoes
except when loud - that is
approximately 1500-2000 yds.
Could not hear - indefinite.
7000 yds in 6 min 22 sec

290 = 23.9
435 = 13.7

(33)

Same as 32. Noise getting stronger.

No launches running.
Could not hear about 5 min 45 sec
4000 cps 4" 05"
7000 " 6" 45"
10,000 " 9" 55"

Believe safe to say can hear 3000 cps.

(34)

Then connected up the resonance
tube to audion circuit. High 11 mfd
Launch in so could not
separate

Response at 13.5"
Could not determine whether
Launch or Torpedo made this noise

(35)

Same as 34 -
Hardly heard to 5 min 30 sec (5000 cps)
with tube. Firing tug then left
grounds and interfered. (Imbalance)
Heard best at 6.2"

5/23/17
640

8/20/17

Repeat Saturday's experiment as
conclusions then were indiginate.

f_{res}

4000

7000

10,000

12,500

Wired moderate small white caps
#0 Resum mounted on tripod used.
Resonance column and head telephone
in parallel on output circuit.
Resum are high resistance column
lower so that they shunt the resum.
(34)

Resum head

3 min.

Tube Post

3 min

7000 gap

7-23%

Tube has balanced diaphragm
and tuned to 6.1" air column.

Dawson listened in to get torpedos
note. Says there are several
of which the lowest and most
prominent is E' - or 640 vibrations
per second.

(45)

16/6.50
40

Hanley was able to tune out launch running just previous to torpedos. Dawson confirmed this.

Hanley reports that in his telephone room a variety of noises could be heard. The tube diminishes these noises and leaves the torpedo note at 6.1" tuning undiminished.

(37)
Same as 36 to confirm but
will use new points on tube.

Torpedos fired without hail being
raised as we were not ready.
Sounds very weak in earpiece.

Ear piece's Post
Lantern started
Column gone

4 sec
minutes.
4 min 20 sec

Could not hear at 6.1" tuning.
Heard at 12.1" tuning.
Most prominent note E^b about 600
vibrations.

Hanley says not as loud as before.
Audition down so that filament $C = 1.5$ m.p.s.

1.5
1.2
3.8

(38)

Same as 37

Wind now up. numerous white
caps on bay.

Brought anderson back to 1.3 filament
current.

Car Reverses lost at	1mm 30 sec.
Tube lost	4" 7 sec.
4000 up	4mm 17 sec.

Resonance tubes hear at 12: tuning
Lawson says note was different
from before & could not easily
distinguish. Sounded G = 384.

Heard very faint in telephone ear pieces.

Wind too high here so Embellane
(torpedo firing tug) stopped firing
and put back for Sag Harbor.

On pulling in horn, found one
of the ropes fouled so that
the tripod was upset. Think
this occurred from roll of boat
between the 36 & 37 experiment.

8/21/17

Hanley left last night so
Dawson and I had to take the
resonance tube and learn to
use it.

The water supply at first would
not drive the water high
enough. This proved due to
air in the siphon tube.

(39)



Preliminary for Dawson to get
get used to Resonance tube.

Used #1 Resonance on tripod.

Lead covered input.

Resonance tube which balanced
diaphragm.

Could hear typewords with ① telephone
ear pieces for 3 min 11 sec.

Torpedo made 4000 yards in. 4 min 55 sec.
Dawson turned to 4 pitches at 10" x 7".

Same as ⁽³⁹⁾38
With telephone saw burst to min 27 sec.
Dawson saw heard at 6.1" - 4 min
at 9.9" - 7 min.

Note was E = 320.
This was a "ceel" torpedo -
superheater did not work.
Made only 4000 - 5000 yards.
Could see it creeping along.

Same as ⁽⁴⁰⁾39 but removed D.
telephone saw pieces.

Dawson reports at 6.1" heard 3 min
8.2 " 5"
10.1 " 7"

At 6 min a launch started up.

Went over to Embury and was
informed that the torpedoes propellers
make 1300 R.P.M. and have
4 blades

$\frac{\sqrt{4 \times 1300}}{3} = 37$ vibrations per
second. The noise of a torpedo
certainly does not sound this
low a note.

Launches up to #11 make 400
R.P.M. #11 makes 600 R.P.M.

(41)
Same as 39.

Audions have a high pitched whistle
Hear with telephone ear pieces to 1 min 20 sec
Torpedo made 4000 yds 4 min 21 1/2 sec
" " 7000 " 7 " 25 1/2"
" " 10000 " 10 " 37"

Dawson started resonance tubes
at 50 and worked up.
Heard at 50 & 34 loudest.
Stopped at 28 and thought he
heard torpedo but sound did not
diminish. Probably pump on

Emblane

(42)

Exchanged places with Dawson.
I took residence column.

Water moved not sure about
86"

Water moves up and down
in column so slowly it is
practically useless. Torpedo has
gone before you can turn for it.
Water takes 4 min to go from 6 to 56.

(43)

Dawson at Resonance Tube.

Heard torpedo with head telephones

to

Torpedo made 4000 yds	4 min 37 sec.
Launch starts	4 " 13 1/2 "
Torpedo made 7000 yds	5 " 0 "
" 10000 "	7 " 14 "
	10 " 19 1/2 "

Dawson heard to 17 for 4 min.

Then tuned to 32 - Heard too long

Sound did not die away

Believes he can hear torpedo
at any place on column

(114) same as 1's
Dawson at Resonance Tube.
High telephone ear piece hear torpedo / mm. 5000
Torpedo made 4000 ybs - 4 mm. 7 sec.
" " " 7000 " 7 " 03"
Dawson heard Torpedos but sound
of pump on Emilleone became
more prominent at 17 kunning.

Is unable to tune so that torpedo
sounds loud and other noises are
cut out.

(115) Same as 1's except K at Resonance Tube
Note of torpedo very close to 300
vibrations per second.
Then close could hear this note
prominently.
Tube seemed to tune to this at
12.1".

Other popping & sizzling
noises coming in excited
resonance tube to give same
note.

8/21/17

Storm last night. High
wind this morning - too high
for Embeline to go out.

I went to Orange to see about

- ① Cable which came wrong.
- ② New Receiver Leads
- ③ Mr. E's coming to Sag. Harbor.
- ④ Cash.

No readings to day

8/22/17.

Mr. E. arrived on Dasher
about 8:30.

Embarkation did not go out
but we went to Noyack Bay
to test audions against Moares
new microphone.

~~Discussion with Moares
about the new microphone
which is much better than
the old one.~~

~~On the way to Noyack Bay
we saw a large number of
birds flying over the water.
The birds were of various
species and were very
noisy.~~

On Short Range (Noyack Bay)
Connected up Moares new
microphone transmitter. With
batteries alone (without audions)
bell could not be heard.

They connected up audions
so that could use Moore's microphone
and #2 Resonator alternately.

Moore's microphone hummed and
chirruped very badly. Also
absolutely insensitive so that
a bee flying over them could
not be heard.

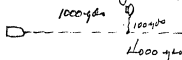
Could hear Jaynotes 1000 to 2000
yds away with regular #2
Resonator.

Moore then took microphone
out of water. Water ran out
of equalizing tube proving that
it had leaked and admitted
air. Baudette's diaphragm
less sensitive.

On putting back in water,
whistling started. Microphone
very sensitive but poor on
no quality. Tanager & torpeo
sound nearly same.

(46)

Moore's Microphone suspended
from side of boat as input.
Short Range - Noyack Bay.



Could hear torpedo, from time fired
until reached 4000 yds.
The sound is not clear - there is
a humming and excess of rattle
which is mixed with the torpedo.

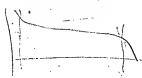
Torpedo also has only low notes.
Does not have high notes
hear with #2 Receiver.

Moore's Microphone is very
sensitive but has very poor
quality - rips badly and has
lot of noise.

Is 30 times as sensitive as #2
Receiver, but poor quality.

①

1- 49 1/5 sec
 4000 - 4 13 1/5 sec
 7000 - 7 - 14 1/5
 10000 - 10 - 21
 12500 - 13 - 15



③

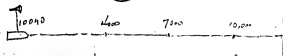
②
 2- 50 sec
 4000 - 4 - 20
 7000 - 7 - 15
 10,000 - 10 - 17
 12,500 2- 38 1/5
 4000 - 4 - 11 1/5
 7000 - 7 - 9 1/5
 10,000
 12,500

8/24/17.

On Long Range in Gardner's Bay.
 Launched #3 Record with lead
 covered input.

Jerry listened in to confirm
 previous records by Dawson
 & self.

④



Jerry says torpedo sounds like
 street car around corner - screech
 as described.

Pump on Emlana 100 yds makes
 considerable noise.

Jerry listened in.
 Audition of "Row"

Jerry ceases to hear
 torpedo makes 4000 yds

1 min 49 1/5 sec.

4 " 13 1/5 "

7 " 14 1/5 "

10 " 21 "

13 " 15 " (11.5)

" " 7000 "

" " 10000 "

" " 12500 "

(47)

Swimmer took
Jerry sent him
Down " "
4000 " -

2-00.
4-25
4-09 $\frac{1}{2}$

$\frac{2.59}{3\frac{1}{2}}$

(48)

Same as 47 except Audions
on "High".

Jerry ceased to hear torpedo	2 min 50 sec
Torpedo made 4000 yds	4 " 20 "
" " 7000 "	7 " 15 "
" " 10000 "	10 " 17 "

(49)

Same as 48 but tender was
run around Rampant to make noise
Jerry ceased to hear torpedo 2 min 28 $\frac{1}{2}$ sec.
Torpedo made 4000 yds 4 " 11 $\frac{1}{2}$ "
" " 7000 " 7 " 9 $\frac{1}{2}$ "

More connected microphone to
Audions. Made intermittent
muzzled note like wireless.
This was so loud as to obliterate
other sounds characteristic
of the source

(50)

More then connected up his
microphone with pair of Bell
Telephones to work as load on

Connected Bell telephones in series and found not nearly as good.

Receivers.

Used this at same time as Audions. Dawson listened to Audions, Jerry to Moore's microphone.

Jerry test torpedo with microphone in 2 min.
Dawson " " Audions 4 min. - 75 p.p.s.
Torpedo made 1000 yards. 4" 09 1/2 p.p.s.

^{2nd Memo}
Airplane left here.
Dawson listened in on her leaving and
could hear for 8 minutes, estimated
at 2000 yards.

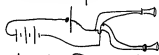
Dawson listened in on 2 torpedoes
with Moore's Microphone. Said
note was musical, clear and
distinct and $G = 384$ vibrations

Best connection for Moore's
microphone 3 models in series,
2 Bell Receivers to both ears
connected in parallel.

Think it would be a fine idea
to use Moore's Microphone with
one or two audions.

A-5

Test of Moore Microphone
Tender went out and Jerry lost
in 250 yards.



#2 Microphone

Sea choppy, few white caps. about 1/2 mi.

kind shy W.

B-6 only ~~some~~ ^{Kennel} ^{Laurel}

Moore connected our horn on his
microphone connected as above.

~~Beetle~~ Rang Bee. Characteristic sound
with cunctos. #1 microphone

Made about 1000 yds when
Jerry could not hear short funnel

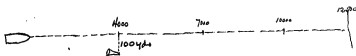
C-7.

Same as B-6 except Moore
used #1 microphone

As adjusted, this microphone
varies periodically, getting louder,
then softer.

Jerry ceased to hear at about
800 yards.

8/25/17.



Weather - Ideal at 8:30 am. Absolute
Calm. not a ripple

Missed first shot because not set
up. If sea apparatus is designed
with rings to hang and rods
so as to hang in fixed direction,
much time should be saved.

Could hear noise of SP192's pumps
through air 2000 yds off. Could
also hear with mbones microphone
and could hear through megaphone.

Have never had such quiet & ideal
conditions before.

Microphone gives trouble by intermittent
huzzing. This seems due to
intermittent contact at microphone
points.

1st shot missed
 2nd shot microphone in bad condition
 #1 micro 1-56
 #2 micro 3-36
 Slow 3rd launch running 400 yds off (1st shot)
 4000 = 4-04
 Bliss launch started 4:10 - 100 yds away
 2nd Bliss launch running by at 100 yds
 Torpedo to right of course
 7000 = 7-10
 10,000

1st shot missed. Not Ready

2nd shot (57) 9:10 am
 Weather perfectly calm.
 #2 microphone pointed at Emblem
 Jerry 1st hears torpedo 1 min 56 1/2 sec.
 " says loudest 3" - 36"
 4" - 04"
 7" - 10"
 Microphone insensitive and having
 intermittent buzzes
 Slow speed launch running 400 yds off stern
 Bliss launch started 4:10 - 100 yds away
 2nd Bliss launch running 100 yds away
 These launches prevented hearing torpedo
 further.
 Torpedo ran to right of course about
 40 yds at 4000

3d shot missed. Microphone out
 of order.
 Jerry heard torpedo swimming
 at about 300 yds. Says note
 was C' = 512 Hz.

Jerry heard 35 sec.

Jerry can hear Blues Lammok with
microphone at 3000 yds.

4th shot

10:45 am Still very
calm

(52)

4th shot.

Same conditions as D.
Microphone in good order.

Jerry heard torpedo in 35 sec.

Roudest

3 min 55 sec

I heard to (3000 yds) 7. 17 sec

Jerry listened to our lammok and
could hear about 500 yds.

5th shot missed record. Lammok
paying attention to ball. Jerry
thought

5th shot missed record. Has not
paying attention to ball.

~~shot~~
(53)

same as E

11:37 Am

Weather overcast. Fog to West.

Dead Calm

Jerry heard torpedo

38 $\frac{1}{2}$ sec.

" deep loudish

3 min 55 sec

4000 yds

4 " 65 "

Jerry can't hear

5 " 48 $\frac{1}{2}$ "

Ship launch towing torpedo back
about 2000 yds away marked.

Torpedo about 20 yds to Starboard.

(54) ~~6th shot~~

Slow speed launch 1000 yds away
towing boat.

12:04 P.M.

Dead Calm

Jerry hears

1 min 46 sec

" " loudish

6 " 50 sec

→ 4000 yds

7 " 47 $\frac{1}{2}$ "

Jerry can hear

10 " 57 sec.

Cold shot going slow

(55)

12:49 P.M.

Dead Calm.

Tray to westward

Jerry hears torpedo
Launch started from Ambulance
4000 yds away just before
torpedo.

55 sec

Jerry says loudest

4 min 15 sec.

4000 yds

4 " 27 "

Dawson says note is E' = 640 N

Jerry can't hear

6 min 56 $\frac{2}{3}$ sec.

(56)

1:19 P.M.

Dead Calm

clearing.

Jerry hears torpedo

1 min 53 sec.

Jerry says loudest

4 " 0 "

4000 yds

4 " 8 $\frac{3}{4}$ "

Blanchard started 100 yds away

Jerry can hear it

4 " 10 "

6 " 16 "

(57)
2:00 P.M.

Dead Calm

Jerry hears torpedo (#r) 1 min 25 sec.

" " " loudest 4" 0 "

" " " loudest 7" 05 "

More listening in on his
microphone #1 without horn

More hears torpedo 1 min 30 sec

" " " loudest 4" 00 "

" " " loudest 6" 56 1/2 "

Kennedy heard with ears under
water, sound like wind through
telegraph wires. Heard 3 min
after started or for 1000 yards

(58)
2:58 P.M.

Dead Calm

Kennedy hears torpedo (#r) 1:53

" " " loudest 6:45

More hears torpedo (#1) 1-16 1/5

" " " loudest 4-20

" " " loudest 7-00

In 6:45 Bliss launch started
100 yards away. K could
not distinguish torpedo after
this time.

Rampant 26¢

Frank Kingland Capt 100.00
Peter Oelan Silver 53.00
James Carmody Steward 75¢
Newman

PA for May.
May 26 ✓
June 8 ✓
June 8 ✓
Aug 23

6/1/13 Carmody advance 10.00
Leas milk .25

Yankee

✓ John	3.95 ✓
✓ Black	✓ 1.50
✓ Cook (Lawson)	✓ 5.00
✓ John	1.00 ✓
✓ Cook	2.00 ✓
✓ John	20.00
✓ John	2.00
✓ Cook	1.00
	20.10

John	\$ 43.61
Cook	11.65

60

$\frac{70}{5}$
14

$\frac{260}{20}$

15

3 - ✓

15

$\frac{15}{5}$

3.56

$\frac{53.56}{9.95}$

43.61

60

5.95

100

200

200

120

9.95

$\frac{715}{30}$ (214 $\frac{4}{30}$)
25.86

5/1 - 1/3000
5/2 - 1 1/2

8.33
25.00



135



**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments -- A. M. Kennedy Books
Notebook, N-17-08-27**

This notebook was used by Absalom M. Kennedy during August-October 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The entries relate to a series of experiments, numbered from 59 through 108, on submarine torpedo detection. The experiments at the beginning of the book, which contain extensive notations by Edison, involve the use of various combinations of transmitters and receivers to listen to torpedoes fired from the USS *Emblane* at Sag Harbor, Long Island. Information is provided regarding weather conditions, other vessels in the vicinity, and the time elapsing before the torpedo was first heard, as well as when its sound was the loudest and when it could no longer be heard. There are also experiments with microphones, receivers, torpedo floats, towing ropes, and containers conducted at Gardiners Bay, Greenport Harbor, and other Long Island locations. The notes indicate that Jerry T. Chesler, E. Rowland Dawson, and Sherwood T. (Sam) Moore assisted with the work. Inserted into the book are sixteen small pages pertaining to experiments 74-80. The front cover is labeled "Experiments #5. From 8/27/17 to 10/9/17." The pages are unnumbered. Some pages have been removed from the book, and several pages of drawings have been pasted into it. Approximately 125 pages have been used.

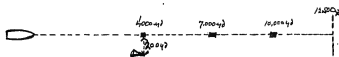
8/27/17.

Schedule outlined by Mr.
Edison for to-day.

- ① Put Magneto on Big Horn - 000 wire
- ② Menie's Microphone on Big Horn
- ③ " " " Route "
- ④ Run your own engine, detach
out.
- ⑤ If the running of your own
engine don't shorten
hearing distance as much
as you expect, run your
own launch in circle
closely around your own
boat. Listen in booth -

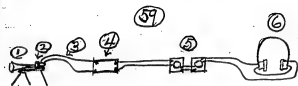
Time 10:00 AM
 2 birds in
 ground at entrance
 (one to low)
 3 birds in
 ground
 4 birds in low
 5 birds in low
 6 birds in low
 7 birds in low
 8 birds in low
 9 birds in low
 10 birds in low
 11 birds in low
 12 birds in low
 13 birds in low
 14 birds in low
 15 birds in low
 16 birds in low
 17 birds in low
 18 birds in low
 19 birds in low
 20 birds in low
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 89 birds in low
 90 birds in low
 91 birds in low
 92 birds in low
 93 birds in low
 94 birds in low
 95 birds in low
 96 birds in low
 97 birds in low
 98 birds in low
 99 birds in low
 100 birds in low

Lubbock 8/27/17.



Position - 4000 yds from Emblem
200 yds to right of course.

Weather - Bright clear morning.
Wind fresh N SW, some
white caps. Waves 8" to
12".



- ① = small horn on tripod
- ② = new, 002 wire, 1000 ohm receivers.
- ③ = Rubber covered, stranded
pair wire with steel insert.
- ④ = Audions set on "high"
- ⑤ = Shunt holes set at 24
- ⑥ = 3000 ohm pair head receivers.

$$\begin{array}{r} 123 \\ 3916 \\ \hline 5749 \end{array}$$

1233

$$\begin{array}{r} 123 \\ 3916 \\ \hline 5749 \end{array}$$

$$\begin{array}{r} 123 \\ 3916 \\ \hline 5749 \end{array}$$

3916

$$\begin{array}{r} 44 \\ 3709 \\ \hline 233 \end{array}$$

Lubbock

(59)

Time

9:03 am.

Wind - moderates very few white caps.

Interference Also launch started 100 yds away at 11 minutes.

1233 yph Time to hear torpedo (3000 yds) 1 min - 14 sec

3916 Loudest 3" - 55"

Can't hear (3500 yds) 7" - 40 1/2"

Shot # 1

Notes:

2683 yds

Jerry in hatch so could not see start of torpedo at all and he yelled when could hear, loudest, and could not hear.

Can see torpedo coming against sun only about 300 yds. Can see it running away against sun for about 6000 yds.

255
3) 1215
4250
4400

1250
600

In booth

(60)

Same as 59 except blunt
notes ⑤ set at 40.

Time

9:20 am

Wind - same as previous

Interference - Bliss Rammah started
up in 4 min, 100 yds
away

Time to hear Torpedo (6000 yds) 2 min 00 sec

Loudest

4" 15"

Can't hear (6000 yds)

6" 25"

Shot # 2

4000 yds

4" 16 1/2"

7000 "

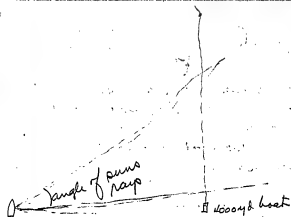
7" 24"

Notes:

2000 yds

Confirmed previous notes on
being torpedo coming &
gung.

Evident can not hear
as far with this set
of boxes which is less
sensitive



This torpedo had unusual amount of mist & smoke.

Could see coming for 2000 yds before it got in angle of sun's rays.

Then could not see until 800 yds. away.

Sun higher now making conditions different from previous experiment

Luckett

(61)

Same as 59 except shirt hoses with infinite resistance so as to make maximum sensitiveness.

Shot No 3.

Time

9:41 am.

Wind - liss, no white caps, waves about 6" high.

Interference - Bliss launch running about 1500 yds away, stopped when torpedo started.

Time to hear Torpedo

0 min - 7 sec (?)

Lowest

4 " 08 "

Can't hear

6 " 43 "

4000 yds

4 " 15 "

7000 "

7 " 19 "

Notes:

Jerry states at this sensitiveness, could not tell positively when started & when stopped, sure of torpedo sound above other noises only when loud.

See opposite page for sun condition.

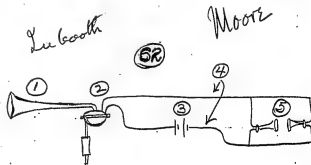
Sun now pretty well
up in sky.

This torpedo showed
up very great amount
of mist.

Could see torpedo coming,
2500 to 3000 yds off. Could
see going 6000 yds.

2 Bliss launches stopped
when torpedo started but
started after 4 minutes
and at 7 minutes was
100 yds off and masked
time to "cant hear".

Rampant breeze to
waves and rolling
considerably.



Position same as 59

Apparatus -

- ① = Big Horn
- ② = Moore's Microphone #1
- ③ = 2 cells B-2 E.S.B.
- ④ = #18 Tuntstain Pair, solid wire.
- ⑤ = Two Bell receivers in parallel ones on both ears.

Shot No. 4

Time 10:25 am

Wind Quiet. no white caps, only
4" to 6" waves.

Interference Returns Rough 100 yds away
at 7 min

Time to hear Torpedo (3500 yds) 0 min. 22.3 sec

Lowest 4 " 10 "

Cant Hear, (2500 yds) 7 " 39 "

4000 - 4:27 | 7000 - 7:47

Notes - see opp. page.

Lubath

Moore

(63)

Same as 62

Spot # 5

Time 10:45 am.

Wind - Still more calm.

Interference - Bliss launch running
1500 yds away until
torpedo started. Started
up again in about
4 min and at 6 min
was 100 yds off.

Time to hear torpedo = Jerry yelled 1/2 minute
before torpedo started.
4 min 00 sec.

Lowest
Can't hear (3000 yd) 7:15 "

4000 - 4:18 7000 - 7:28

Notes: Jerry yelled could hear torpedo
1/2 minute before started. This
was probably Bliss launch
4500 yds away.

Torpedo had very little
vapor. Could see 2500
yds coming + 5000 to 6000
going.

Could see torpedoes
3000 yds coming
and 6000 yds going.

In booth

(64)

Same as 62 except engine of
Pumpant running without
clutch in at about regular
running speed.

Spot # 6

Time 11:35 am.

Wind Light - very small waves.

Interference Bliss launch towing
torpedo running whole
time torpedo was running.
The Bliss launch started
up 100 yds away within

Time to hear torpedo. 1 min 07 sec

Lowest 4" 25 "

Can't hear 6" 03 "

4000 - 4:11 $\frac{1}{2}$ 7000 - 7:19 $\frac{1}{2}$

Notes -

Engine running does not
seem to interfere much
if any.

2 Bliss Launches running
very evidently distinguished
from these.

(15)

→ around, all was confusion and nothing could be distinguished.

Thinks microphone the better of the two as less foreign sounds and the sound more distinctive.

Will make test when men listening does not know when "Steel is up" or when to expect torpedos

Suggest test without horn which seems to collect extraneous sounds and give all the same characteristics, or "horn tone".

(65)

Same as previous except tender running around Rampart same time engine is running with clutch out.

Shot # 7

Time 11:57 am

Visual Quiet - no white caps - 4" waves.

Interference - Large white yacht running 1200 yds. off. B. launch started in 4 min 100 yds off. Saw launch running around boat.

Time to hear torpedos. before started. 4 min 15 sec
Loudest Carot hear Interference too great could not distinguish

4000 = 4:17 - 7000 = 7:25

Notes: Jerry says if did not know when ball went up and when to listen for, could not detect torpedos less than 300 yds away. With the engine running, and 3 launches running,

This torpedo made practically
no vapor and was very
difficult to see. Jumped
out of water once &
ran to surface two other
times.

Same as ⁽⁶⁶⁾62
Jerry listened to confirm and
get ready for next test.

Step #8

Time 12:45 P.M.

Wind - Light - no white caps.

Interference - 1 Bliss Launch

running slow 100 yds off
when torpedo started.

2 Bliss Launches met
running in opposite
directions about 600 yds
away about 5 min after
torpedo started.

Time to hear torpedo - 1 min 27 sec.

Loudest 3: 57°

Can't Hear 7: 15°

4000 - 4:13 - 7000 - off or stopped

Notes: Hearing launch just
after test Jerry says the
launch sound in microphone
is very similar to torpedo
sound, confirming
what we found in
audions. → see opp page.

→ and run to the right.

Just previous to this while waiting, both Jerry and Moore announced several times they heard torpedoes when launches were running.

Endlane then
aft. no more torpedoes
for day.

(67)

Jerry stayed down in booth from last shot to this so as not to know when ball was up or have any other warning of torpedo.

Spot # 9

Time 2 = 20

Wind - Up tripe. No white caps

Interference - none for 2 1/2 minutes, then launch (Bliss)

#10 started towards
Endlane.

Time to bear torpedo (Jerry 1 min 27 sec + 53 1/2" Moore 1 min 10 sec + 40 sec)

Loudest (Jerry 7 min 10 sec - 40 sec)

Earst Hear (Moore 11 min 45 sec)

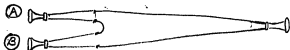
4000 7 min 18 sec 7000 - did not go

Notes: Moore put out his #9 microphone underneath him and listened also.

Ord. shot - ran only half speed, seemed to turn about 60° to 45°.

6B

Test of 1 and 2 Bell telephones
used as transmitters -



- ① Using in series as shown
- ② Short circuiting A so as to
have only B working

Could not see any difference.



- ① Using in parallel as shown
- ② Disconnecting A

Could not see any difference.

Dawson used vacuum shunt
box set at 8.

Notes:

Jerry listened on #1
Moore " " #2
Dawson " " #3

all went below deck and
did not know when ball
was up or torpedoes fired.

On account of rough sea
I could not see torpedoes
200 yds coming or 500 yds
going.

as neither Jerry, Moore or
Dawson knew when was
coming they

Detected it absolutely!!!

Jerry and Dawson both state
that because of the absence of
noise and "horn tone" they
can hear better without horn
than with it.

Weather so rough Emblane stopped
firing.

Was Dawson shunt off - Cw 8

8/28/17

Booth not
used

(69)

Comparative test between:

- ① Moore Microphone #1
- ② " " #2
- ③ 1000 ohm vacuum ^{in vacuo} & Audions 4 ^{4 pins} _{What Ear phone used for}

All were suspended overhead,
without horns, pointed toward
the Emblane.

Position - same as 59 - 4000 yds from Emblane

Shot # 1

Time 9:50 am.

Wind High - 15 miles White Caps. Waves 13".

Interference - none until 4 min. ^{after launch} 2-15%

1750 yds net 2250 yards definition 3" ¹ before, started -
Rise to bear torpedoes ² 2 min 2 min 05 sec ³ 22 sec

3634 366

Lowest

Can't hear

4000-4:17

7000

opposite side

Torpedoes within 12000
yards - not accepted

8/28/17

Notes.
(69) shot #1

Chester heard it 1750 yds away 1600 yds afterward

Moore " 197 " 2500 "

Dawson " 3634 " 4666 "

notwithstanding White Caps waves on boat & Bliss
launched gaff 14 minutes after start of torpedoes
This torpedo went 12000 yards did not
make the 12500 yards & was not accepted

Dawson, 2 miles - 342 ft low 2.65 miles going

(70)

~~General Notes:~~
~~Missed 3 torpedoes. 1 not~~
~~set up. The first two passed~~
~~and third stopped just beyond~~
~~4000 yd seaw.~~
~~1 and 2 announced all~~
~~three of these and told when~~
~~first & second passed.~~
~~Long delay after third shot~~
~~in which 1, 2 & 3 were~~
~~set up. 1 & 2 made about~~
~~4 or 5 false reports of torpedoes~~
~~each. 3 made 1 false report.~~

General Notes:

Missed 3 torpedoes, 1 not set up. The first two passed and third stopped just beyond 4000 yd seaw.

1 and 2 announced all three of these and told when first & second passed. Long delay after third shot in which 1, 2 & 3 were set up. 1 & 2 made about 4 or 5 false reports of torpedoes each. 3 made 1 false report.

At 10:45 changed 1 from Moors #2 microphone to #1 because #2 microphone gave false sounds.

At 11:21 changed back as more adjusted #2.

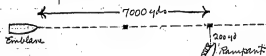
8/29/17.

(70)

Comparative Test Between:

- ① Moors Microphone #2 connected (erry on) to 1 stage audion ^{type 1 audi.} 300 ohm cov.
- ② Moors Microphone #1 without (moss on) audion.
- ③ 1000 ohm receiver with 4 stage (Dawson on) audion. 80 ohm ear piece & on output circuit. Shunt box set at 8. Two mags open

All three were suspended overhead pointed toward the Emblane.



Position - 7000 yards from Emblane
 200 yds off course as above

Shot # 4

Time 11:37 am.

Wind Moderate

General Notes continued:

Jerry, Moore & Dawson left ^{torpedo} was
had no warning when fired.

I saw this torpedo with glasses
coming 5000 yds away. Lost
it when it went through a
patch of sunlight shining through
the clouds.

Watch with which time was
taken about 18 minutes
lost so that for absolute
time 13 minutes should
be deducted.

Does this mean it started
2000 yds off at 7:00
and was not noticed then

(10) continued

Interference: none when torpedo
Bliss Ramah about 2000 yds off in 7 min

Time to reach torpedo { ① 3:29
② 3:33
③ 4:11 -

101 3516 yards Best
2 Doubtful - 3450 yds
3 2817

Loudest

hear

{ ① 6:20
② 6:20
③ 6:20

3000 yds
beyond

Can't hear

{ ① 9:10
② 9:05
③ 9:00

Torpedo ran 4000 yards in. 3:47 $\frac{3}{4}$
" " 7000 " " 6:30

Notes: ① and ② announced torpedo
at 9:55 when no torpedo was
seen running. ① heard one
at 10:07.

Must have been some boat
or thing mistaken
a torpedo as at
got it small enough
that it has been a long
time.

{ ③ announced at 10:24.
① " " 10:26:10.
② " " 10:24:15.
① " " 10:28.
② " " 10:50
③ " " 11:30

Mixed 5th shot. Was missing
up lamps.

Mixed 6th shot - Did not
see ball up & other
signals.

These under water transmitters
are now shaped -



Memo



that is the sound must
enter a very small opening and
expand to diaphragm.

Would they not be more sensitive
if the diaphragms had larger
openings to the water?

Mixed #5, & 6

(71)

Same as 70 except to obviate
hearing each other yelling signals,
lamps were wired from the three
and time taken from these lamp
flashes.

Position: same as 70.

Shot #: 7

Time 1:27 PM

Wind - Breeze - few white caps
Blue funnel - 6000 yds off

Interference - none

Time to bear torpedo

101-3667

2 - 2057

3 - 2057

Lowest

143

2050 yds
with Blue funnel

Can't hear

4000 yds 4:03 1/2

Notes

last fair test.

#3 gave 1 false signal ahead of
time.

- ① 3:20-
- ② 2:22-
- ③ 4:57
- ① 6:54
- ② 5:00-7:15
- ③ 6:52
- ① 8:45
- ② 8:25
- ③ 8:24

7000 yds 7:00

This shows

① what outside interference in the shape of launch & waves would do

② The boys had been steadily looking pieces to ears and at attention for an hour and were probably tired.

When them became so high the Emblane stopped & went in.

Dawson says staying this long a time in closed up stuffy booth makes eyes dull & knocks the alertness out of all your senses —

The booth can easily be ventilated,

Same as 71 in all respects. 72

Position: same as 70.

Spot # 8

Time 2:36

Wind - High - White Caps - 2 ft waves

Interference Launch sloops ran 30 yds off at 2 min masking test badly. Plus Launch 1000 yds at 7 min.

Time to hear { ① 5:10 animal at 8:15
②
③ 6:36 animal at 10:00

Lowest { ① —
② —
③ —

Can't hear { ① —
② —
③ —

4000 yds 3:55 7000 yds 6:35

Notes:

#3 - 1 false signal. Launch running 1000
#1 - 1 " " Launch 5000 yds away
#1 false " " After boat 1500 yds away
#3 " " Launch 11 1200 yds

Capt of Emblanc says Torpedo gets
her full portraet speed 500 yards
after firing - Maximum speed
500 yards - 29 knots -

Chester hears Emblanc's air
compressor all the time when
at 4000 yards its a slow
thump & dont bother -

Chester says Motor boats sound
resembles the torpedos, also
that there are other boats
running besides Bliss boats
which in future will be noted
in log & approximate position
by Hardy & an additional man detailed from
192 crew

Chester says Emblanc has a
Dynamo, 10/ RW running all
the time,

also at 4000 yards state
he heard pump of 192
going all the time

Chester's deep white Caps & striking
of waves against boat being
how do not bother hearing
the high notes of the Torpedos
but Motor boats interfere
badly as notes have a
resemblance -

72 feet -
A Power loop 30 yards
away prevented hearing
torpedos when torpedos was
5000 yards distant approaching
& Torpedos was not heard at
all by Dawson ~~Moore~~ Moore
or Chester's - while loop ~~was~~
was in proximity in fact
not during the run as a Patrol
boat started up 7 minutes after
Torpedos started,

8/30/17.

Get set up. Emblane came by.
Jerry without seeing her detected
at 1000 yards with #1 equipment.
(see description later)

Jerry gets a note from
Emblane which Dawson
identifies as A7 = 435 N.

Jerry hears 166 pulsations
per minute, probably the
speed of the Emblane's engine

at 8:10 a tug with derrick
slow speed tug passed.
This engine was running 160
per minute. Jerry thinks it
was this he heard and not
the Emblane. The steam engine
of the Emblane are evidently
not as loud as the gas engine
of this tug. This tug was
moving on the same course
as the Emblane but slower
in speed.

8/30/17.

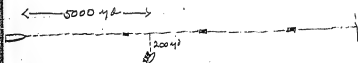
(78)

Comparative Test Between:

- ① - Moore's Microphone #2, connected to 1 stage audion with 1 Bell (double filament, low amplification) 3000^W ear pieces, Jerry listening.
- ② - Moore's Microphone #1, straight to pair of Bell receivers. Moore listening.
- ③ - 1000^W - .002" wire receiver, to input of 4 stage audion set on high with shunt box at 0. 80° angle receiver was Dawson listening.

Listeners did not know when torpedo was fired as all were below deck. Did not know when each other signalled as the signals were sent by lamp flashes.

(78 contd)



Position: 5000 yds from Embankment
(estimated) 200 yds (est) off
course.

Shot # 1

Time 9:10 am.

Wind moderate, no white caps.

Interference:

No launches running while
torpedo was running to
Rampant or while test
was being made.

Symbols

Symbols a dash between figures
thus 4-05 means
minutes & seconds from
time torpedo is fired.

A colon between figures means hours & minutes of the day - that is o'clock.

Three signals used.

Long flash = think I hear. top
Series of dashes = sure " " "

Deriv. of dashes + sure

Series of dots = annulling & start over

Jerry hears & identifies Bliss
Lamish 2000 yds away.

(73 contd)

1750 yards

① Shinks $38\frac{3}{5}$ sec
Sure $3\frac{1}{5}$ sec

Q17 କଟକ

② sure 4-05

Time to hear

③ Thinker 3-15-20

917 yds

sure 4-05-20

4000 yds. $H=0.5$ 7000 yds.

← Notes:

① Thinks he hears at 9:47^{am} (Lisa Lannich 150 yards off). ② sure he hears 9:50.

③ thinks he has 9:51 am. ③ annuall
9:55 am. slow speed time.

② Since he hears 9:02 am Annulus, 9:04
slowly 9:01, 1 am 10:00

① Thinks he hears 9:03am Annals 4-08:
slow opt Annals 2000-04

③ Thinks he hears 9:06. Annals 9:06. 9:00-9:06
a new old launch 9:00-9:06

① Thinks he hears 9:00

③ Thinks he hears 7-0-7. answers 7-18.

① Annulus 9-10 am

74

Errors -

- ② at 9:30 Slow speed launch 1000 yds off.
 ① annulled 9:33
 ② at 9:34 Bliss Launch 1000 yds
 ① " 9:35 " " "
 ③ " 9:35 " " "
 ① Annuls 9:36
 ② " 9:37
 ① hears at 9:38 slow ops launch 1000 yds
 ③ Annuls 9:39
 ① " 9:39
 ③ Hears 9:41 Bliss Launch 3500 yds
 ① " 9:42 " " 3500 yds
 ③ " 9:42 " " " "
 ① Annuls 9:43
 ① Hears 9:44 Bliss Launch 1000 yds
 ③ Annuls 9:45 " " "
 ② Annuls 9:45 " " "
 ① " 9:45 " " "
 ① Hears 9:46 B. Launch stopped & started
 ② " 9:46 " " "
 ③ " 9:48 " " 300 yds off
 ② Annuls 9:50 " " "
 ③ Hears 9:52 B. Launch 1500 yds
 ② " 9:59 B. Launch towing torpedo
 ① Annuls 10:00 ② Annuls 10:01

74

Same as 73 except that signal system is changed. The sure or confirming signal will be omitted and only the hear and annul signals used. Also "loudst" or when torpedo passes the Rampant will be recorded as this confirms the torpedo.

Positions: Same as 73.

Shot # 2

Time 11:43 a.m.

Wind

Interference: Bliss Launch 2000 yds off at about 1/4 min.

Also running at slow speed motor boat at 3000 yds & the motor tug at 3000 yds.

74
 → Intermission here as were hunting for lost tapes

Errors continued:

- ① hears 10:04 Blue Lammah 300 yds.
- ① Annals 10:04
- #11 Lammah went by at 10:18. All say sounds almost exactly like a torpedo
- ② hears 10:21 Blue Lammah 5000 yds behind ear
- ② annals 10:21
- ② hears 10:31 Blue Lammah 300 yds off
- ② Annals 10:32
- ② hears 11:02 Blue Lammah 3500 yds off
- ② 11:04 3000
- ① annals 11:06
- ③ hears 11:25 Slow speed tug 300 yds
- ③ Annals 11:27 behind boat
- ① hears 11:32 Slow speed tug 600 yds
- ① Annals 11:34

Dawson says he heard it but thought was Lammah & could not distinguish.

4000 = 4110

74 cont'd

1650
 Time to reach { ① 3:07
 366 yds { ② 4:38
 ③ —

Lowest { ① 5:02
 ② 6:10
 ③ —

Notes: When this is put into practice the listener should be where he can see the sea so that his eyes can help his ears to interpret what is occurring.

4000 yds in 4 min 10 sec

Searching for lost tapes
 off 4000 yds away accounts
 for delay between 1st & 2nd
 photos.

Smoke bomb fired by Jackson
① pit, moon obscured sail boat
behind.

Errors:

- ③ - 12:09 before fired
② - 12:09

CRIO = 4.103

(75)

Same as 74 except 1 bulb
more sensitive, more voltage)
in single stage audion.

Position same as 73.

Shot # 3

Time 12:10 P.M.

Wind: Brisk ^{in gusts} white caps. 18" waves.

Interference: Very slight 2 slow.

Speed launches 3000 yds away.

Time to hear { ① 3-01
② 20 sec before started
③ 30 " " "

Loudest

{ ① 4-56
② 4-56
③ 4-55

Notes:

Knew when ball was up
this time.

Ransom says audions were
crackling from waves and
he could not be sure until
torpedo was very close.
Ransom says 3000^{yd} pair of ear piece
much better than 80^{yd} and.

4000 yds in
from 0800

Errors: none

(76)

Same as 75.

Position = same as 73.

Spot # 3

Time 1:04

Wind Moderates. 18 evas but no white.

Interference: Bliss Launch 200 yds at
5-30, masking badly. Another Bliss
Launch 400 yds away at 4 min.

Time to hear { ① 4-30 — 500 yds
② 3-57
③ 5-00

Loudest { ① 5-17
② 4-50
③ —

Notes:

4000 yds. 4-04

Bliss Launches masked badly
this time.

On last two torpedoes Jerry tried
revers with resonating tubes with
negative results. Not as loud and
could not time so as to resonate

Errors:

- 1500 yds away.
- ③ hears at 1:28. Launch (small) about
 - ③ annuls 1:30.
 - ① hears 1:30 Launch 1500 yds away.
 - ② " 1:31 " " "
 - ① annul 1:33
 - ② annuls 1:34
 - ① hears 1:35 ^{Release Launch 3500 yds.} Launch 1500 " "
 - ① annuls 1:37
 - ① hears 1:39 ^{Release Launch 7500 yds.} Launch 1500 " "
 - ① hears 1:41 " " 1000
 - ② Annuls 1:41
 - ② hears 1:42 ^{Release Launch 700 yds.}
 - ② annuls 1:45
 - ① hears 1:51 nothing in sight.
 - ② " 1:52
 - ① Annuls 1:53
 - ② " 1:54
 - ② " 1:57 unable to pick running.

(77)

Same as 75.

Position - same as 73.

Shot #4.

Time 1:54 P.M.

Wind Moderate. Few white caps.

Interference: None at start.

at 4 minutes. Launch starts at 1000 yards.

Time to hear { ① 2-54 — 2100 yds
② 3-47 — 1016
③ 3-48 — 1016.

Loudest { ① 5-14
② 5-19
③ 5-24

Notes: 4000 yds. 4-10

① signalled 1 min 05 sec after annulled in 2 min 30 sec

More & Jerry state that quiet of wind on the ropes which suspend their microphones disturbs them with external noises.

Use pipes

Errors:

none

(78)

Same as 74. Jerry uses L or less - sensitive buib. again to verify.

Position Same as 73.

Shot # 5

Time 2:32 P.M.

Wind Moderate - few white caps.

Interference: - Slow speed sleep with gasoline engine 1500 yds off at first after 4 minutes Bliss heard started 4000 yds away

Time to hear { ① 3-15 1750
② 3-36%
③ 3-53

Lowest { ① 4-57%
② 5-19
③ 5-04

Notes: 4000 yds 4:00

The interference was not heard. Do not know why we do not catch it as early to day as before unless it was accident before or the men grow tired and dull from being at constant attention.

Errors:

None.

Believe lack of errors in this previous experiment due to firing being rapid & close together.

Men don't get chance to be alone - nerves on edge from waiting and therefore hear things.

One difference to day from yesterday. Water about 47 ft deep yesterday. Does not show on chart but is 42 ft deep today at 5000 yards.

Same as ⁽⁷⁹⁾74.

Position Same as 73.

Spot #6

Time 3:47

Wind Moderate - few white caps

Interference: Bless launch running by at 200 yds when fired. Slow speed
slip 2000 yds off & run across course.
Very bad interference.

<u>Time to hear</u>	①	3-21	1650 yds
	②	4-06	
	③	4-30 $\frac{1}{2}$	
<u>Lowest</u>	①	5-25	
	②	5-41	
	③	5-16	
<u>Notes</u>	- 4000 yds - 4-16		

Interference very bad this time.

Jerry tried resonator. Could not tune to any particular note.

Errors:

- ② - 3:27 hours - 2 launches
⑦ - annals 3:27

⑧
Same as 74.
Dawson lit receiver down deeper.
More make microphone a little more
sensitive.

Position same

Spot #7

Time 3:27 Pm.

Wind Moderate - very few white caps.

Interference: Blue launch too
far away when torpedo started
kept running 4 min. launch started in 4 min.

Time to hear { ① 3-07½ 1883.
 ② 3-32
 ③

Loudest { ① 5-10
 ② 5-21
 ③

Notes: 4000 = 4-06

Dawson's audions gave trouble
noisy & knock. Batteries which
had been put on fresh dropped
in voltage so that too low
and did not have time to act
in another cell.

→ 2 per second.

Jerry says sound was
like exhaust of factory
engine - puff-puff.

Average of all jerry's
Reading. Except the Bliss
launch one 200 yds away

1894 yards SW -

42 ft water - was gathered
by rope vibrating -

Invention bulb 1 stage
induction - microphone -

(81)

Test to see who can first
hear Enblane and describe
what sounds like

Moore hears Enblane at 2000 yds.

Bliss launch 300 yds off &
interferes

Dawson hears Enblane about
same time...

At 1000 yds for Enblane, Jerry
says launch at 400 yds
going away so loud masks
the Enblane. Launch sounds
like locomotive going away.
Jerry hears Enblane at 400 yds
launch at 1000.

Moore now says he heard launch
and not Enblane. Just hear
Enblane at 400 yards.

Jerry says speed of Engine 180,
per minute.

Moore says speed 2 per second.
and describes sound as of
waking beam of ferry about
2 1/2 seconds apart. With this
heard another sound about

Emblane Engin

240 Rev

Triple Expansion Eng
single screw

Pump: about 30

Centrifugal pump for
bilge -

Forced draft fan - high water

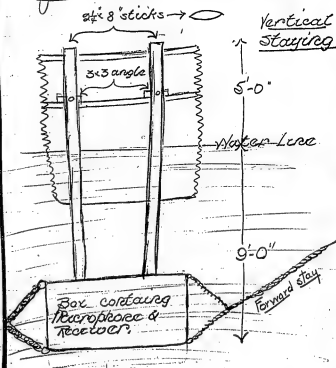
Generator 550 Rev

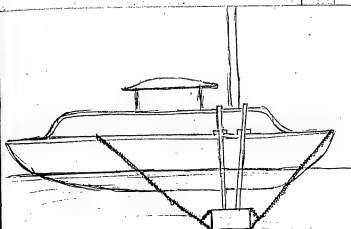
91 segments in

Commutator 4 poles →

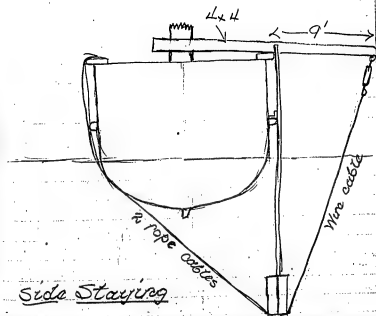
9/7/17.

Test of Moore's #2 microphone
and regular #2 receiver in
float attached to Rampant.

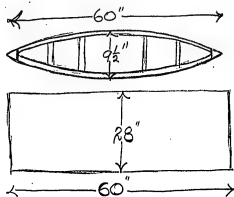




Stern and Lift Staying



Side Staying



Detail of boat.



Section of vertical stays.

9/7/17

(82)

Place Gardiner's Bay, off
windmill on N.W. shore.

Weather Rough early in morning.
Light wind, no white
caps at time of experiment

Rigged up boat with Morris #2
microphone to single stage
audion and pair of Beel
recivers. Also with regular
#2 receiver to input of stage
audion, output to 300 ohm
recivers.

Tested out without engine
running with beel. Both
quiet and sensitive.

Started engine running. Both
very noisy.

Started boat. At 4 miles per
hour, steel cables vibrated so as
to make loud, low pitched note.
At 8 mi per hour vibration so

violent had to stop.

Loosened all cables but kept engine running. Still very noisy - too much so to use.

Took all staying cables off leaving only the vertical stays. With engine running still too noisy.

This shows that the microphone can not be rigidly affixed to the boat as engine and other vibrations are thereby transmitted to it.

In the previous vertical stays used iron straps 5 and 8' long holding the 4"x4" uprights formed, which though heavy & stiff themselves, acted as springs because of the great mass (probably 400-450 lbs when full of water) of the boat holding the microphone.

9/12/17-

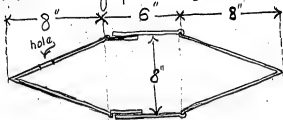
(33)

Place Chungking Harbour

Weather - Very quiet. Beautiful almost calm.

Object - To find the towing capabilities of various shapes of containers for Morse's Microphone.

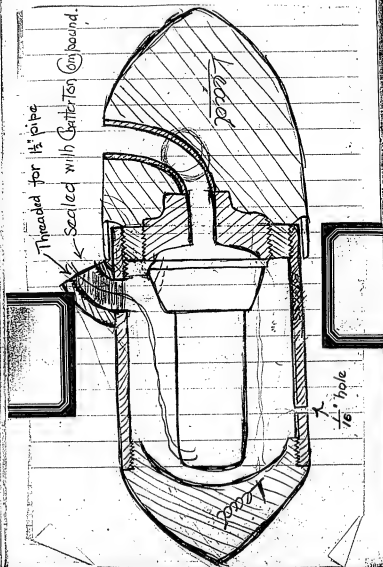
Jerry had tin-smith make up containers of galvanized iron.



- ① Box's hole as shown put rope through and towed from row boat at about 2 1/2 miles per hour.

Container tilted up up at bow, but kept stable; did not tend to rotate or jump from side to side.

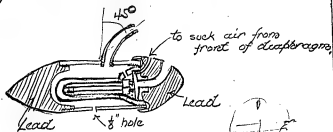
- ② They took ashore and filled with sand and gravel. Showed more resistance reducing speed of row boat to about $\frac{1}{2}$ to 2 miles per hour. Jerry could not see but from alternate jerks at towing rope judges it was jerking from side to side.



9/15/17.

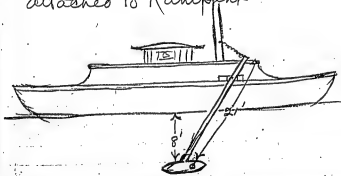
(84)

Test of stream-line container
for 1000 ohm receiver.



First tested out 1000 ohm
receiver & found working OK.

Then assembled on 1 1/2\"/>

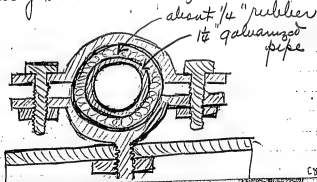


They tested out as input of
4 stage audion

On test with bell found circuit
very quiet - better than ever heard
it before, also sensitive and
accurate. The overtones of the
bell were clear, as I never
heard them with audions
before.

Tried thumping on desk
~~found the sound was transmitted~~
to the 1000 ohm receiver.

Put rubber between clamp and
pipe to prevent vibrations
being transmitted to receiver.



This deadened the vibrations
from deck to some extent
~~but not completely.~~

Then started engine of Rampant.
Engine noise loud in upper
arc out of auditions.

Then ran Rampant in inlet
out of Green.

The pipe and container
carried nicely, and pulsing
on the boat carried at an
angle of about 40° with
the water.

Made however an incessant
grapeing roar. Could not
hear engine or any other
noise for this roar.

On listening to end of pipe
and close to water this
roar seems the amplified
sound of the rush of the
pipe through the water.

The lead painted container seems very good. Makes the receiver quiet and sensitive. Lead seems a good deadener of high frequency vibrations.

The rubber padding between tube and deck supports seems to absorb vibrations from deck to tube to some extent.

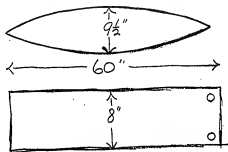
The water swirling around the $1\frac{1}{4}$ " pipe makes considerable noise even at 7 or 8 miles per hour ~~the~~ vibrations of which are conveyed to the receiver as a continuous roar.

It may be possible to put a flexible connection between the container and pipe and get rid of a great deal of this noise.

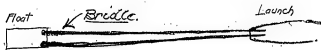
9/17/17.

Test of float

(85)



Float rides
curved side
down.



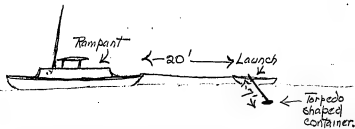
- ① Towed float about 10' behind launch. Launch running about 6 miles per hour.

Float ran submerged but shifted from side to side.

- ② Then lengthened to about 25 ft. Float remained submerged and continued to make pom

side to side.

No ballast was put in float.
It had holes so that it contained
water.



Torpedo shaped container of
pewee fastened to side of
Launch & towed by Rampant.
Container fastened to 1 1/2 tube,
roped to side of Launch.

1000^W pewee connected to input
of audions.

① Listened in Rampant stee,
Output very quiet and seemed
sensitive

- ② Listened in with engine of Rampant running, ~~clutch~~ out & boat not moving.

Could hear engine quite plainly - Loud.

- ③ With Rampant under way about 8 mi per hour.

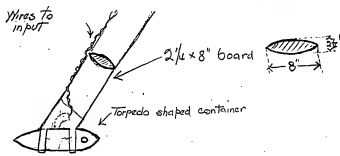
Noise very much increased so much so that other sounds could not be distinguished.

- ④ Rampant under way with engine stopped entirely. While at any speed noise still quite loud, noise diminished with speed.

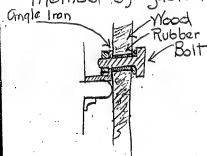
9/18/17.

(86)

Test drawing Torpedo shaped container through water with stream line board.



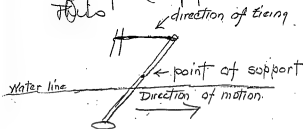
Method of fastening to Rampant.



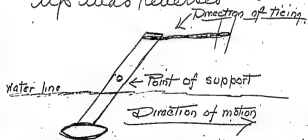
Note

Stream line of plank diminished friction to a considerable degree as compared with round pipe.

Boat hung at 45°
With pipe it was necessary to pull backward on top of pipe supported below this



With wood direction of tieing up was reversed



① Tested with engine of Rampant still.

Audions very quiet, sensitive.

② With Rampant's engine running but not under way. Could hear engine in audion plainly but not as loud as with iron pipe formerly used.

③ Rampant under way. Quite noisy. Not as much as with iron pipe formerly used but still too noisy for service.

④ Rampant under way but with engine stopped. Not as noisy as with engine running but still too noisy for service.

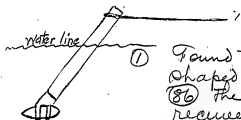
This noise could be heard by putting ear to top of wood piece and is due to rush of water.

Jerry describes this noise as the
trickling of dropping water and
this is greatly amplified by audions.

9/19/17.

(86)

Attempts to get receiver container mounted on board to tow without sound conducting fastening to transport.



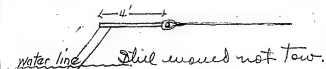
① Found that with shaped plank as (86) the plank with receiver floated and balanced upright in water.

② Then tried towing dragging with rope as shown above. Would not tow but could balance with hands so that it would tow.

③ Nailed stick about 4 ft long on top as shown

Notes:

When



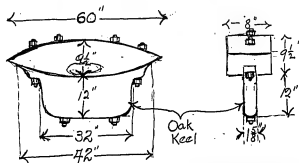
④ Then tried cutting angle of board on top so as to be parallel with surface of water when pushing. Still moved not tow except when managed by hand.

Note - Boat heads are
above surface of float.
This was built rough,
to use material on hand.
- not smoothed up. →

9/19/17

(87)

Towing Float is (85) with keel.



Float as used in (85) fitted
with $12'' \times 42'' \times 1/8''$ oak keel.

The float portion $9\frac{1}{2}'' \times 60''$ is
perforated and fills with
water.

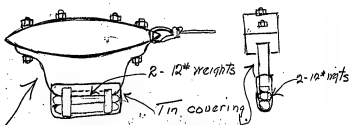
Jerry towed this model behind
launch, running at about
4 miles per hour.

Model submerged, towed
steadily without pumps
sidewise or vertically.

Note - Surface of float
and keel ROUGH -
and with bracts etc.
projecting →

(88)

Towing Float with weighted keel.



Same as (87) except, 2, 12# cask weights
fastened to bottom of keel and covered
with sheet tin.

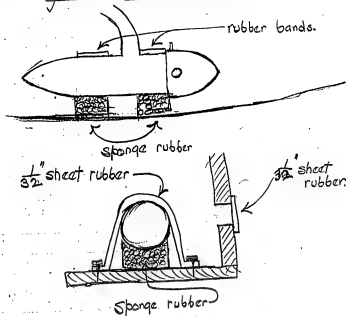
Towed behind launch at
about 4 miles per hour.

Stayed under water and
towed nicely without jumping
either horizontally or vertically.

9/30/17

(89)

Listening to sounds with
float towed as in (88).

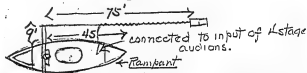


Details of fastening torpedo shaped
container to float.

Same float as in (88).
~~except that~~ in securing weights was
removed.

9/21/77

(90)



Method of towing float from Rampant

- A When running slow, about 5 miles per hour, float was submerged, rode steadily. Jerry could hear sound of Rampant's engines running with clutch out but very little other noise.
- B Then speeded up, about 8 miles per hour, before the float came to surface, engine noise increased but very little other noise.

After running a minute or two float surfaced and turned over. noise then very great.

90 continued

Tins were then placed on the sides of the float to hold under water while under way. These were of wood $4" \times 12" \times \frac{1}{8}"$ placed about 12" from bow of float at angle of about 15° .



C Float was towed with 75ft rope.

At 4 miles per hour remained below surface, rode smoothly. Heard engine of Rampant. Very little other noise.

At 8 miles per hour. Remained below surface. Rode smooth. Heard engine of Rampant very little other noise.

With engine of Rampant stopped. Very quiet. Could hear launch 600 yds away.

D. Then let out about 200ft rope.

Rode smooth at 8 miles per hour under surface. Engine of Rampant as loud and plain as C.

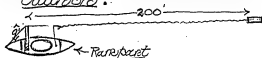
Stopped engine. Very quiet. Heard launch 1000 yds. away.

This float was very crude. Boat heads and other projections to make ripples. Even with its projections it proved that at 8 miles per hour the noise of drawing the reevers in a float or container could be eliminated. Noise of engine of Rampant was not eliminated. A steamer will however have very much less engine noise.

9/22/77

(91)

Determine how far can hear
Launch.



Towed float Reeding 1000⁰⁰ receivers
connected to input of audions
200 yds from 9' boom on Rampant.

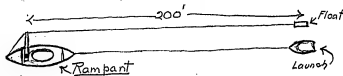
Dropped launch at Jennings Point
(Shelter Island Sound). Ran
1500 yds (determined from map)
away, stopped engine of Rampant
and listened for launch.

Jerry could not distinguish
launch but could hear plainly
an oyster boat about 800 yds
away.

9/22/17

(98.)

To determine how float
rides at speeds and at
what depths.



Observed float from Launch
towed close to float.

At 4 miles per hour (estimated)
float ran $1\frac{1}{2}$ to 2 ft under
surface and dived up and
down slowly.

At 8 miles per hour (estimated)
float ran 6 ft under surface
and ran very even & smooth.

9/23/17.

(93)

- A. Mr. Edison listened to engine and noted engine noises then listened in ~~an~~ audions with input connected to 10000 receiver torpedo shaped receptacle in towing float as in (89).

Said that the audion noises did not correspond to the engine noises and were, therefore from some other source, probably from the shaking of the audion bells due to vibration of boat.

- B. Directed that the diaphragm be removed from the receiver to determine whether this noise was due to vibration of audion bells from shake of boat or from air and other noises picked up

outside.

Removed diaphragm and connected receiver to input of audions and started engine. Found no pronounced noise except clear cut clicks, twice the number of revolutions of the engine.

On disconnecting one of the make & break wires these clicks changed from

to -----
and are probably due to the magnetic inductive effects of the make & break coil as these contacts are made.

9/23/17

(94)

Test to determine speed of
Rampart.

Run between Breakwater off
Youngs point and red buoy off
Fanning point in Newport
Harbor, there scale 2000 yds on
chart.

1. Test - With wind and tide.

Made 2000 yds in 8½ min.

Average Engine Speed 254 R.P.M.

= 1760 yds in 7½ min or 8 miles per hour.

(Engine missing)

2. Test - against wind and tide

Made 2000 yds in 12 min

Average Engine Speed 237 R.P.M.

= 1760 yds in 10½ min or 5¾ mi. per hour.

(Engine missing badly)

3. Test, slow speed - with wind and tide

Made 2000 yds. in 13 minutes

Average Engine Speed 159 R.P.M.

= 1760 yds. in 11.44 min or 5¼ mi. per hour.

This gives Rampant speed of
6.8 miles per hour in still water
as speeds run, or taking bath
at 2.54 P.M. = 7.1 miles per hr.
With engines running still, Rampant
will make about 8 miles per hour
at full speed.

Wind and tide apparently amounted
to 1.8 miles per hour.

Taking lowest speed at 5.25 miles
per hour with wind & tide gives
Rampant 3.45 miles per hour
at lowest speed.

Will repeat these tests when
engine is running good.

(95)

9/23/17.

Towing Float with Long Line.

Let out float without power on long line.

At 300 ft - pull 180# per second

At 500 " - " 240# " "

At 1000 " - " 300# " "

about 4 ft under surface.

The pull is estimated by Jerry from number of men to pull in.

Pump was run at full speed or about 7 miles per hour as engine was running badly.

With 1000 ft of line out the speed of pump is noticeably reduced.

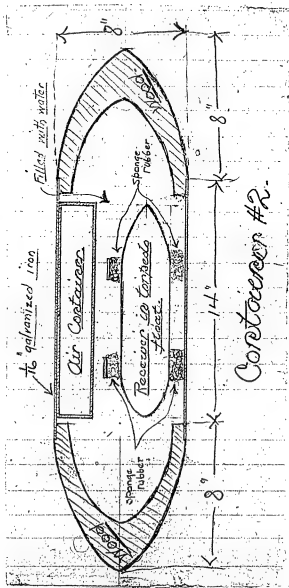
9/24/17.

Worked on engine of Rampant.
Jerry found exhaust valve of
1st cylinder out of time and
corrected. Also found valve
needed grinding.

Left Sag Harbor. Engine ran
270 R.P.M. and showed good speed.
Later Lawrence slowed up and
showed 1st cylinder clipping.

Between 1st buoy in Noyack
Bay and Red Buoy off Paradise
Point, 3350 rpm took 18 min at
236 P.M. or at 6.3 miles
per hour.

An getting in took out exhaust
valve of 1st cylinder and
found it tight. Decided to
grind valves of Rampant's
engine.



9/25/7.

Worked more on Rampant Engine.
Got container #2 from Neal
and Chite.

Had wooden ends which were
sectional, held together with
nails and painted. Reused
in torpedo float put in
place. Extension tube made to
suck out air.

On Run of Rampant, made
270 R.P.M for few minutes. Then
stopped, ran slowly & speed
down to 230 R.P.M.

Ground all valves. Got jump
back to work.

9/26/17.

Jerry took out strainer of Carburetor and found clogged. Cleared and put back. Testd engine and ran speed as high as 350 R.P.M. while under way.

Made speed test of Rampant between breakwater and red buoy off Fanning Point - 2000 yards.

① East - 2000 yds 6 min 45 sec. Av. Eng. Spd. 299.

② West - 2000 yds 9 min 29 sec. Av. Eng. Spd. 323.

① 2000 yds in 6 min 45 sec = 1760 yds in 5 min 56 sec
or practically 10 miles per hour

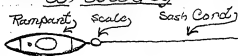
② 2000 yds in 9 min 29 sec = 1760 yds in 8 min 20 sec
or 7.7 miles per hour

Average in still water 8.6 miles per hour.

9/26/17

(95)

Resistance of $\frac{3}{8}$ " sash cord
to towing



Rampant running about 8.6
miles per hour less than of the
pull of the cord.

500 ft cord
800 " "
1000 " "

45#
85#
92#

then towed the float used in

(88)

With about 1000 ft of line out
and before Rampant had
gotten up to full speed line
broke and line and float
were lost.
Scale showed 480# on break.

9/26/17.

(96)

Towing Container #2

Container #2 was fitted up and towed. Fastened with $\frac{3}{8}$ " dash cord as shown



Tumbled and rolled badly.

Keel, 4" broad by 14" long of $\frac{1}{8}$ " galvanized iron was soldered to bottom.

Turned upside down and tumbled as bad as ever.

2-side fins 3" wide by 10' long were soldered to sides in addition to keel.

Turned sideways and plunged.

Keel was then removed.

If started right side up
would come to surface and
plunge up and down like
a porpoise.

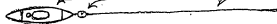
If started up side down would
try and stand nose up
in water.

9/27/17.

(97)

Strain of towing $\frac{1}{2}$ " tarred
Manilla Rope.

Rampant Scale, $\frac{1}{2}$ " Manilla rope.



Rampant at full speed about
8 miles per hour

500' -
1000' -

58#
107#

(98)

Towing Launch.

Rampant full speed, about
8 miles per hour

Pull of Launch

155#

9/27/17.

Towing Container #R.

With Rampant at full speed
about 8 miles per hour.

Pull with 120 ft line and
wire = 20#

(100)

Change of Fins on Container
#R.

- A Took off all fins of
yesterday and put on
crossed fins on tail



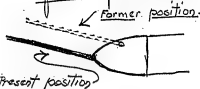
Towed steadily but came to
surface.

- B. Side fins on tail turned down
to make bow dive.



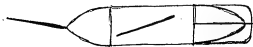
Container turned over and
ran sidewise.

- C. Then changed towing rope
from point on top to nose.



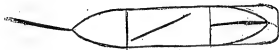
Container ran right side
up, smoothly but came to
surface

D. Added inclined side fins
to force under water



Container ran smoothly
about 6" to 1 ft under
surface.

E. Inclined horizontal tail
fins to throw tail up
throw down

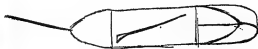


Container ran smoothly
about 2 or 3 ft below
surface.

Note - It is evident that for towing models the fins and weights must be arranged so that

- ① It will remain upright, ~~that it will not roll~~.
- ② Will not drift or plunge vertically or horizontally.
- ③ Will ride parallel to surface of water.
- ④ Will ride at even depth which should be at least 5 or 6 ft. inland or smooth water and probably deeper, about 12 ft. for open sea.

F Inclined front tips
of side fins downward.

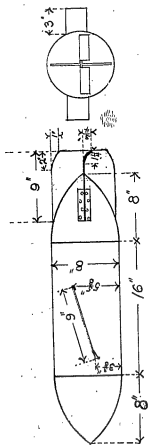


Container ran evenly 5 or 6 ft. below surface which is what is desired.

This model is now satisfactory as it rides smoothly & evenly at the desired depth and with only a small resistance - about 30#. Its shape and size are convenient.

G Then connected up to Audions.

At first fairly quiet, could hear some engine noise. Then became noisy



Details of Fins on Container #8.
Scale = $\frac{1}{8}$ size.

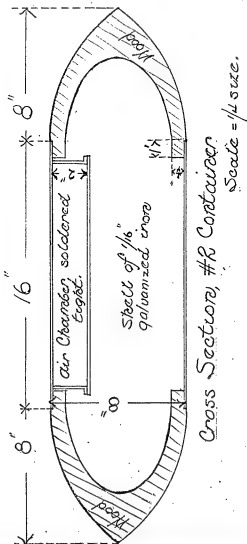
could still hear engine noises
but with crackles & roars.

Tested out and found grounded.

E. M. T. of testing battery	134 Vacs
" one side to ground	110 "
" other " " "	120 "

Mill dry out, test out and
locate ground.

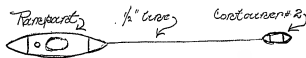
Found ground in reservoir. Sent
Stanley to Orange with it to
clear and insulate.



9/28/17

(10)

Test, towing Container #2
on 1/2" Manilla Line.



Ran Rampant at full speed
about 8 miles per hour.

550 ft of line out = 100# pull
1000 " " = 150# pull

Container #2 ran perfectly steady
and with this long rope,
Jury estimates 20 ft under
surface.

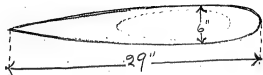
Will adjust to run less deep.

9/29/17.

Found that the air chamber of #2 container leaked and was half full of water.

Emptied it and after resoldering two or three times, soldered up so that it would remain under 20 ft of water 24 hours without leaking.

Jerry had wooden stream line model made 29" long, 6" diameter



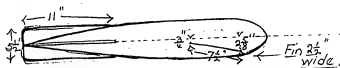
Hollowed out inside.

Sent Frank and Earl after the "Hydraulics" running short handed.

10/1/17.

High winds, clouds and some rain.

Rigged up wooden model with tail and side fins -



(102)
Towing Wooden Model.



About 10# lead was put in cavity.

Model still floated, but with fins under water.

On towing at about 7 to 8 miles per hour, model towed well, did not tumble ^{or} rotate but had slight sideways ^{motion} and remained about 3 or 4 feet under surface.

(103)

Towing Model #2 with small fin inclination.

Fins on #2 were changed so that the tail was straight and side fins had inclination of about $1\frac{1}{2}^\circ$ in 9° .



Let out about 150 ft of line.
Ran just below the surface

Now have this made towing
50 ft below surface, too deep,
and at surface, too shallow,
both, right side up and
without tumbling or jumping
which seems to show that
there will be no difficulty
in making a model which
will tow at right depth
properly.

Weather too rough and crew
too short to make depth
measurements. Will do this
when hydraulic comes.

(104)

10/2/17.

Tests with Hydraulic.

Log tests.

Going towards Grosvenor's Bay, against tide, towing launch.

1 mile by log in 7 min 05 sec = 8.5 mi per hr.

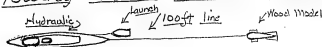
Towards Greenport on way back towing launch -

1 mile = 7 min		= 8.6 mi per hr.
1 " = 6 " 05 sec		= 9.87 " " "
1 " = 6 " 05 "		= 9.87 " " "
2 " = 12 " 20 "		= 9.74 " " "
2 " = 14 " 30 "		= 8.77 " " "

It is evident that the speed of the hydraulic varies so that the log is inaccurate.

Log showed 10 miles from Greenport to point of dead foot where the Van. This scales on map 10 knots, so that the log seems to read knots, not miles.

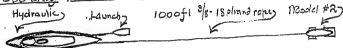
(105)

Towing small wooden model.

Speed of Hydraulic towing
Launch 9 miles per hour.

Small wood model, towed fairly well, apparently 4 or 5 ft below surface, ran even vertically but made slight dives horizontally.

(106)

Towing Model #2.

Speed of Hydraulic, towing launch
9 miles per hour.

Model #2 had fin with 1/2 inch

in 9 inches inclination downward.



Before hydraulics got to speed,
Model 2 ran below surface and
gave pull of 280 #.

At full speed, came to surface
(just awash) and reduced pull to
230 #.

Proved that inclination of
fins was not enough.

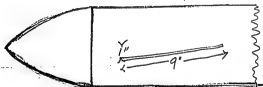
10/3/17

(107)

Adjusting Fins to get proper depth.

In ⑩ #2 ran too deep and in ⑩ not deep enough. It is therefore possible to find a fin inclination at which it showed run at proper depth - believed to be about 6 ft for inside waters and 12 ft for outside waters.

Changed inclination of fins on #2 to 1" in 9".



Towed this behind "Hydraulic"
as in 106.

Speed of Hydraulic 1 mile in 5:48
= 10.4 mi. per hr.

Pull = 320 #

I dropped off inannah to see
how deep the model was
below the surface. Could
not see it but from the
angle of the rope estimated
about 12'. It rides even,
does not jump vertically
or horizontally.

In this case the 1000 ohm
resistor in torpedos shaped
case was fastened in #2
model.

This at the bottom as weights
and the air chamber on top
seems to make this tow upright
without fail.

Test of insulation of receiver
and wire to ground.

Connected reel to B battery (120 volts)
insulated opposite end and dropped
overboard (about 850 ft wire)
Showed static kick on voltmeter
but no steady deflection. Insulation
O.K.

Then connected to receiver in
model #2.

40 volts deflection one side
20 " " other

showing ground in receiver.

This mobile model #2 was on
deck.

Took receiver out of model 2
& tested out. Showed small leakage
at first with wet wires which
diminished as wires dried out
showing that this leakage was
along the surface of the wire.

Then tested vacuum in torpedo shaped case in bucket of water. Showed only leak was on outside of mine.

Then made new joints and dropped #2 and mine overboard.

Showed 2 1/2" vac to deflection that is slight leak to ground. As this is the best mine we have mine have to try as it is.

Then connected up to Audion input and put overboard. Shows only a little noise. This a sort of continuous roar.

Sucking the water out now presents a problem as the towing model hangs upright except when under way and then becomes horizontal.

Another problem in design will be whether the model should have a positive or negative buoyancy.

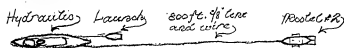
Believe that a very slight positive buoyancy will be best. One which will immerse the receiver but allow the towing model to just come to the surface.

In this way it may be sucked out easily and raised float to the surface if lost or breaks away.

10/8/17

(108)

Test of towing model for
noise.



- ① Let out model #2, with #19 twisted, pulley covered wire on 500 ft. 3/8-18 strand hemp line.

At low speed, about 4 miles per hour, somewhat noisy - predominating was a pushing sort of roar - could hear also each beat of the 3 cylinder engine one louder than rest.

At high speed (about 9 miles per hour) this pushing roaring noise increased and engine noise increased proportionately. There

came in addition a slight
jerkish, somewhat like a
torpedo.
Slowed down and let out
800 ft. rope and wire. (all
wire was had in one piece)

At 800 ft, low speed, noise
seemed less than at 500
but about same character
except that engine noise
was not quite so much.

At full speed (Made 1 mile
in 6 min 43 sec) = 8.8 mi
per hour. The noise again
increased. Engines not quite
as loud as before.

Then had engine stopped.
Engine noise stopped. All
noises diminished as speed
of boat diminished, and
until practically still when
bumping noises showed the
model was hitting bottom.

On drawing in, had picked up two long pieces of kelp.

Recess showed O.K. no water behind diaphragm.

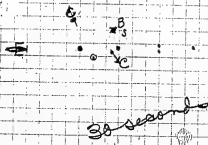
Next time will take

- ① Bridge to measure insulation resistance
- ② Bell to measure sensitiveness
- ③ Take up with Mr. E placing of hole and front find to avoid noise.
- ④ Making totally wooden model to avoid noise of metal shell.
- ⑤ Test tomorrow effect of hole by plugging and unplugging.

Method of depth test of running
Tighten up engine to stop knock
Time to get proper depth

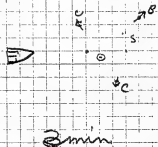
[ITEM(S) FOUND IN BOOK]

Exp. 74-1 - 8/30-17-
30 sec

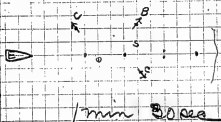


A = Bliss Boat.
B = Gas, tow boat.
C = Slow Mot. Boat
D = High Speed M.B.
S = Sachem
O = This boat.
E = Emblane
• = bow (at mark)

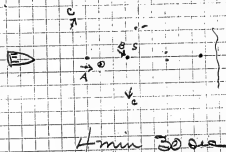
Exp 74-3 Aug 30-17



Exp. 74-2 8/30-17
1 min 30 sec

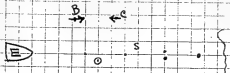


Exp 74-4 8/30-17.



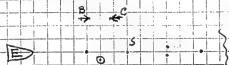
[ITEM(S) FOUND IN BOOK]

Exp 15-1 Aug 30-1917



30 seconds

Exp 15-2

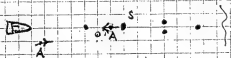


3 minutes

[ITEM(S) FOUND IN BOOK]

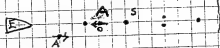
Exp 76-1-

8-30-17



atlas

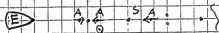
Exp 76-2 - 8/30-17



1 min; 30 sec

Exp 76-3

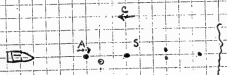
Aug 30-1917



1 min

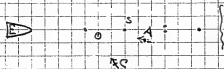
[ITEM(S) FOUND IN BOOK]

Exp 77-1 - 8/30-17

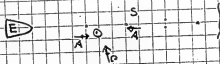


4 minutes

Exp 78-1 Aug 30-1917



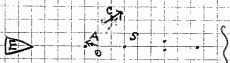
Exp. 78-3 - Aug 30-1917



[ITEM(S) FOUND IN BOOK]

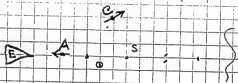
Exp 79-1

Aug 30-1917



Exp. 79-2

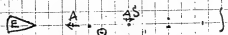
Aug 30-1917



[ITEM(S) FOUND IN BOOK]

Exp 80-2

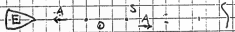
Aug 30-1917



7 min

Exp 80-3

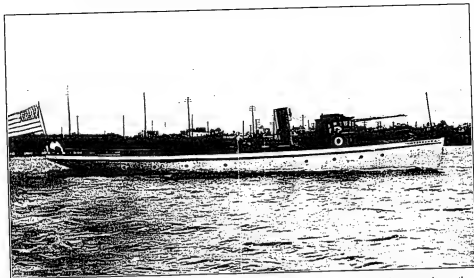
Aug 30-1917



11 min

[ITEM(S) FOUND IN BOOK]

Private Excursion Yacht "HYDRAULIC"



Fast Steam Yacht "Hydraulic" for charter by day or night. Comfortably furnished, expressly for private excursion parties.
An excellent boat for Moonlight Sails up the Hudson or on the Sound. Fitted with awnings and electric lights.
Has two cabins. Rates reasonable.

For further particulars write to the owner
MAX ZWICKEL, c/o Steam Yacht "Hydraulic," 15th STREET DOCK, HOBOKEN, N. J.

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments -- A. M. Kennedy Books
Notebook, N-17-10-04.1**

This notebook was used by Absalom M. Kennedy during October-November 1917 for notes on experimental work for the U.S. Navy performed under the direction of Edison during World War I. The experiments, which relate to submarine and torpedo detection, focus on how best to encase and tow a detection receiver behind a ship. The tests were conducted aboard the USS *Hydraulic* in Long Island, and efforts were made to avoid interference from other vessels. Included is a transcription of a telegram about the experiments sent to Edison in Washington, D.C. The notes indicate that James M. Burns, John A. Hanley, Joe Meilner, and Sherwood T. (Sam) Moore assisted with the work. The front cover is labeled "Experiments #6 From Oct. 4 to Nov. 2, 1917." The pages are unnumbered. Approximately 120 pages have been used.

Here used is

B & S #19-

Plain Pair Pattern Wire, Simplex.

Thine (upland)
From 617
C. J. H. H. H.
M. H. H. H.
New York
Conn.

75428
Home Co.,

MFG. STATIONERS,
96 JOHN ST.
AND
19 PLATT ST.
NEW YORK.

Aut

Spinning Balance, resting at 50#

X Class wire for towing small motor
{ Pair low resistance lead
recorders for use with 1-stage
audions

10/4/17.

Measurement of ground
resistance of Receiver.

Receiver used yesterday was disconnected from long wire, & put in bucket of water. Showed only 3000 ohms resistance to ground.

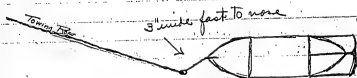
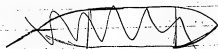
Had Stanley take this one out, and put new magnets in case. After assembly, this showed over 1,000,000 ohms resistance.

Put in bucket of water over night to see if dampness would affect insulation.

R-9370
 $y = 1000000 +$

Moran's Model $4\frac{1}{2}' \times 6' = 8\#$
 Torpedo model $3\frac{1}{2}' \times 13\frac{1}{2}' = \#$

Suggestion. To get fins away
 from metallic body



So as to make depth automatic
 with pull or strain -



As the pull increases the angle
 correspondingly increases and goes deeper.

10/5/17

Measurements of resistance of Recd. Receiver.

Receiver left in bucket of sea
 water over night -

Resistance of coils 987 ohms
 " to ground more than 1,000,000 "

Stanley will put this in model #2
 and smooth up this model for
 towing.

Engineer getting new pins in
 links of engine to run smoothly.

These were completed for engines
 2 and 3.

Made tests on small model
 towing model to try and find
 better position and shape for
 side fins. Found that if these
 fins were carried farther front
 their size could be materially

#1 - 980^W. - much wire
#2 - 834 out wire.

reduced and the fuel correspond-
ingly reduced.

Manly reassembled and
reinsulated pressure.

Coils = 834^W

Insulation - about 1,000,000 ohms.

Note:

In designing towing models the following points should be observed —

- ① Model should be balanced in still water so as to normally float on even keel.
- ② Fins and rudders adjusted so that the forces acting on the model while under way tend to keep it on an even keel.
- ③ It is evident that the front fin, which counterbalance the upward pull of the rope while at speed, should be as far forward as possible, preferably at the point of application of the rope.
- ④ The model should have a slight positive buoyancy but very slight so that the only force required to keep under water will be that of the forward fins pulling against the rope.
- ⑤ Should have buoyancy on top and weight at bottom to support in stable vertical position.

10/6/17.

Next out with hydraulics to test engine more silent. Only one cylinder seems to knock. Will make new pin for this and get knock out.

①

Test of #2 model with Hydros.

- ① Put ^{model} outboard & keel horizontal so as to suck out properly and sucked out.

Let out with 400 ft. of line. At low speed, about 4 miles per hour was noisy. I heard

① roar - ② crackles - ③ engine

noise of which

① = 30°

② = 40°

③ = 50°

This was too much noise. Stopped. Took in and sucked out again. Found that air bubbles come out of case for some time after immersion and these make

quite a loud sound.

After all bubbles had ceased,
listened in. Boat stopped. Very
quiet.

Rang bell soft away.

Very sensitive. Bell loud and
sustained beautiful.

Proves that additions and
resonance making fine and
that noises will be due to
some other source.

While in water
Resistance through coils with 850 ft
#19 wire 94 ohms.

Resistance to ground 1,000,000^{ohms} +.

With 130 volt Battery showed 30 volts
stopped for lunch.

Then put out launch to test
with bell.

Audible very noisy.

Tested with bridge & found only
200,000 to 300,000^{ohms} to ground.

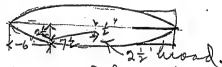
Am afraid we broke down
insulation when put 130 volts
on it.

It is evident that the resistance of a receiver must be perfect. If any moisture gets in, electrolytic action starts and can be plainly heard. Produces noise and plenty of it.

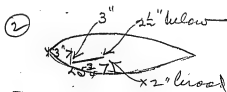
Towed Sail Boat model at
10 miles per hour.
Pull 175 pounds.
Throws wave clear and low
tumbles & has immense wake
Too much disturbance.

(2)
Towing small

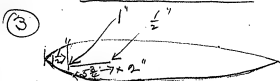
(1)



Original. These held under
for 8 ft.



Towed as deep and well as ①

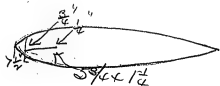


Dives deeper than ② but quivers.

④ Reduced weight inside to same as small transmitter fastened
Same result as ③

⑤ Same as ③ but cut width of fins to $1\frac{1}{2}$ "
Pull less than ③ & did not dive quite as deep.

⑥



Towed on hydraulics at 9 mi
per hour.
Dived - dived too deep.
Pull 30#

⑦

Cut fins to taper to
shape of front.
1 1/2"



Pull reduced to 25#.
Ran quieter!
Apparently same depth

⑧ Made fins 4. "Long
in place of 5 1/4. Otherwise
same.
Pull = 20#
Fork gunner.

⑨ Put section 1 1/4 x 1 1/4 at
same angle as bow fins
little aft of amidships.
Very steady. Good depth.
Pull = 20#

⑩ Put amidships fins off
and bent tail fins up. Off
Pull 40#. Unsteady

Moore left this afternoon.
Said he was going to change and
would be back Sunday night

10/7/17.

(3)

After getting receiver and joints apparently O.K. yesterday went out today to test out.

Put model overboard, held horizontal & poked water out and saw that all bubbles were out.

Put overboard and listened on audions. Very quiet but not quite sensitive as last test.

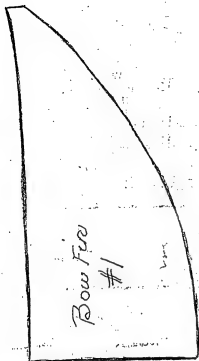
In 10 minutes became noisy. Measuring resistance shows.

Resistance of coils 942 Ω .

Resistance to ground 270,000 Ω .

Will waste time working with this while out. Will make tuning tests with this model to get as low resistance and

as quiet as possible.



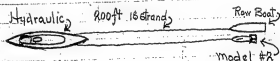
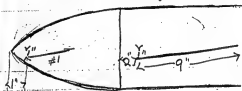
10/7/17

(4)

Towing Tests of Model #2.

Conditions: Towed ^{model} with 200ft 18 strand
tanned manilla rope.
Towed observed in rowboat
at same distance so as
to be able to see the model.

- A. Left side fins on Model #2
and part on bow fins shaped
as shown on opposite page.
Tails straight.



Notes a. It is evident that these models must be adjusted for stable equilibrium

B - Evident that when properly placed, small bow fins are much more effective than larger fins placed farther back.

C - These tail fins control the inclination of the whole model. It is evident that by setting them so that the whole model gives the pressure or strain on the front fins may be still further reduced.

D - Proves above

Result Model moved alternately come to surface and dive under about 3 ft.
Unstable

B - Took off side fins leaving only bow & stern fins.

Result Took steady about 5 ft under surface, but at inclination, forward up, of about 10° .

C - Then bent horizontal tail fins so as to deflect tail upward

Result Dived so deep that we could not see it. Probably more than 8 ft.

D - Changed inclination of front fins to $1/2$ in place of 1°

Result Still dove too deep so that could not see.



E- Then straightened out rear horizontal fin so as to give Tail only slight thrust upward.

Result - Towed about 3 ft under surface almost if not entirely level. Very steady.

F- Changed nose fins to shape B - less surface. Nose now looks like this from above



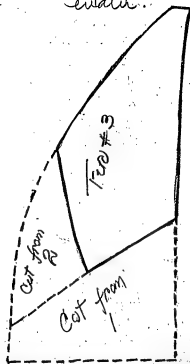
The front of this was 1" (measured on curved surface) from tip of nose.



Result - Unstable. Ran from 3 ft under to surface but on even keel.

Notes G Again proves C

H It is very important to have light at back and water apparently black (no light reflection) in trying to see under water.



G Horizontal rear fins changed so as to force stern upward.
Result - Dived too deep, probably more than 8 ft.

H Changed front fins to #3. Also changed rear horizontal rudders to smaller inclination.
Result - Could not see model yet inclination of nose seemed to show that it was only 3 or 4 ft under.

We were now running so that sun was in my eyes as reflected from water when looking at model.

Changed direction of run so that sun was at back.

Real Result - Could now see model plainly running about 4 ft under surface on blue peel and towing very smoothly.

Notes I.

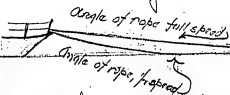
After adjusting with a certain length of rope, it is evident that to change the length of rope must change the depth. This for two reasons—

- ① The angle of pull upward by the rope is less
- ② Weight of rope tends to depress nose.

I - Then let out both row boat and model on 400 ft of rope.

Result. Model again dives too deep to be seen. Probably more than 8 ft.

Notes A Does not prove anything. Apparently resistance does not follow law of square of distance. This is however not disproved by test.



At half speed the rope sags at full speed straightens out so that less rope is exposed.

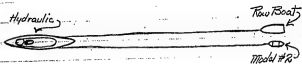
B. With this single front fin, towed fine.

10/8/17

(5)

Towing Tests with Model #2.

Attempted to complete work of yesterday. Did not have scale to take pull then. One we had rusted. Stanley repaired yesterday afternoon. Got new one in Sag Harbor to check by.



A. Let out 200 ft rope
Half Speed (5 mi hr) pull - 30-35#
Full Speed (9 ") " - 50-60#

B. Let out 400 ft rope and went back in raw boat to observe. Weather very rough so that this was difficult. Required two trials to succeed. Model 2 towed about 5 ft

Notes

C-D-E

Seems to show that
the pull of rope is
directly as the length
of rope exposed in water.

F Pull of Model 2 alone
with small fin is
probably 25# or less
since some rope was
in the water.

C #4 fin has area of less
than 2 sq. in. is brought
forward so that front end
is flush with nose and
has inclination of $\frac{1}{2}$ " that
is rear is on horizontal
middle line while front is
 $\frac{1}{2}$ " below this.

under surface and ran level,
Pull at full speed, about 9 mi - 110#

C. Reduced front fin to shape #4*
With 200 ft. rope, pull = (See Note)
40" - 50" at full speed. at end

D. Let out 400 ft. rope.
Full speed pull = 125#

E Let out 800 ft. rope.
Full speed pull = 205" - 215"
Stream pressure 150#
Log = 1 mile in 6 min. 20 sec
= 9.6 mi per hour.

F. To get pull of model alone
let out on 50 ft. rope.
Pull, full speed = 20" - 30"
Pressure 185"
Log = 1 mi 5 min 50 sec
= 10.4 miles per hour.
(Higher speed because of lack of
drag).

G. To get pull of line alone,
let out 800 ft line nothing
on end
Pull = 210# - 220#
Steam pressure 175# to 150#
Log 1 mile = 5 min 55 sec
= 10.2 mi per hr.

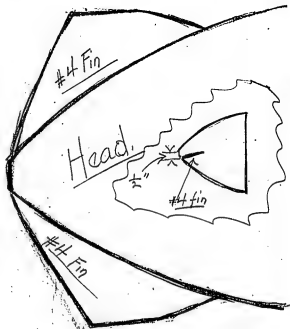
H. Same at slow speed
Pull = 80# - 85#
Log = 1 mile, 11 min, 30 sec
= 5.2 mi per hour.

I. Let out 800 ft new steel
and copper twisted pair
wire.
Pull at full speed = 55#
Steam pressure = 150#
Log = 1 mile 6 min 10 sec
= 9.7 mi. per hour.

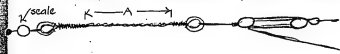
J. Same at half speed
Pull = 15# - 20#
Log = 1 mi in 12 min
= 5 miles per hour.

See next page

Shape of fins #4.



Strain Test of Steel and Copper twisted pair wire.



Pull	Distance H	Stretch	Remarks
000#	19"	—	
100#	19"	—	
200#	19 1/8"	1/8"	
300#	19 1/4"	1/4"	
400#	19 1/2"	1/2"	
500#	19 3/4"	3/4"	
600#	19 7/8"	7/8"	
650#	—	—	Broke in section A.

Previous tests.

Single wire broke	400#
"	350#
"	425#
Double "	375#
"	450#
"	425#
"	400#

*Specifications of U.S.A. Field
Wire manufactured by the
Western Electric Co.*

Consists of 10 strands steel
wire each .0115" diameter
woven around a copper wire
.030" diam., the whole being
about .050" diam. This is
covered with about .130" of
very good tough rubber and
then covered with braided cotton
tapes the whole wire being
about .165" diameter overall.

Test for Noise

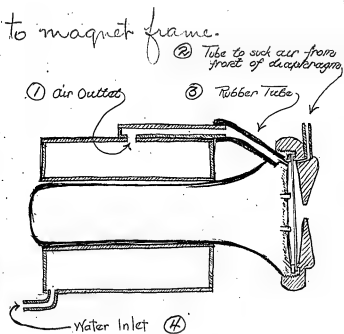
Work on Receivers.

Both 1000⁰ (002" wire) receivers, fell down on resistance to ground, measuring 800" in one case and 1000" in other. The Bell receiver we had been using also showed defective with only about 2500" to ground.

Barley then made up air tank for equalizing pressure on diaphragm so that we could use regular Bell receivers for this work and experiment with insulating them. (Sketch on next page)

This proved much more difficult than anticipated. And we were not able to absolutely locate where the point of failure was though tests seemed to show from magnet windings or terminals

to magnet frame.



Air outlet ① is placed in center of cylinder so that water in cylinder will not enter space behind diaphragm should it need be tilted upward or downward.

⑥

Test of Bell Receiver in
Model #2.

After taking off flexible leads, put rubber cupped pot lead wire on Bell Receiver. Filled back and front (flush with magnet ends) with Pot. Chatterton compound.

Resistance in air showed more than 10,000,000 ohms.

Mounted this in #2 Model and punk near Hydraulics and connected to input of audions.

Output circuit quiet except for legitimate noises (waves, boats etc.)

Went out with Hydraulics to test.

Pit out on 400ft rope. Showed very noisy, pushing sound as of water passing. Some engine noise but crackling in addition.

Let out on 800 ft rope. Noises
about same - engine noise
slightly less.

Measured resistance to ground.
Found about 1200 ohms.

Cut off port lead wires &
put ashboard.

Resistance more than 1,000,000 ω .

Put resistor in bucket of
sea water.

Resistance about 1300 ω .

Took out and dried out.
Resistance about 250,000 ω .

Tested resistance of short
lead in wires only. More
than 1000,000 ohms.

Proving ground in resistor.

Filling Bell Receivers with various materials to preserve insulation to ground.

- ① Bell telephone used in previous test was taken out, Chatterton compound reheated and removed, and new Rot Chatterton compound run in place.

Test showed about 10,000,000 ohms. Put outside in water & connected to input of audions. Suit except for wave and natural noises. Left out an hour. Now noisy - crackles. Tested. Resistance to ground about 1000 ohms.

- ② Filled Bell receiver with mixture 50% Rosowax (probably not pure) 50% resin. Resistance in air more than 1,000,000 ohms.

Put in bucket of sea water.
Resistance = more than 1,000,000 Ω .
Left 30 minutes. Resistance
= 2500 ohms.

- ③ Hardly found apparent trouble
at contact with this.
Repaired and refilled with
fresh 50% resin, 50% bees wax
mixture.
Resistance = 1,000,000 Ω +.
Left in bucket of sea water
1 hour
Resistance = 1,200 Ω .

- ④ Dried out. Resistance
went back to about 1,000,000 Ω .
Vaseline'd all surface around
magnet heads, diaphragm
and under surface of cap.
Assembled and put in
bucket of sea water 1 hour.
Resistance = 20,000 Ω .

- ⑤ Dried out again. Resistance
= 1,000,000 ω +.

Covered magnet tips with
mixture 50% Rosin, 50% bees
wax to depth of $\frac{5}{1000}$ to $\frac{10}{1000}$.

Left in bucket sea water.
Resistance = 50,000 ohms.

- ⑥ Made up another Bell
Receiver, pouring inside
full of melted gutta-percha,
facing of outside by magnet
tips with thin coating of
Chatterton Compound as the
Gutta Percha issued crumble
on surface.

Resistance = 10,000,000 ω +
" after 1 hr = 10,000,000 ω +
" " 1 " = 10,000,000 ω +
" " 2 " = 10,000,000 ω +
" " 2 1/2 " = 10,000,000 ω +

Looks good. Will try out.

⑦
10/14/17.

Towing Test of new receiver.

Handy's new receiver, insulated with gutta-percha, stood overnight in bucket of salt water without breaking down.

Morning fair. Started out to Gardiners Bay to test.

① Let out 1000 ft twisted pair steel and copper wire and measured each 100 ft & left string for tag.

② 800 ft of wire out
Pull at low speed about 28#
4.5 mi per hr =
Pull at full speed
10 mi per hr = 90-100#

③ Connected up to Audions.
At full speed, low, low, missed note, which diminished but slightly at half speed.

Brought in to determine trouble.
Found that the air compartment
had leaked and was full of
water and that we had made
a wrong connection to the
Audions.

Soldered up air compartment.
Put pressure back and smoothed
up every thing with putty
Shellock.

At full speed 10 mi per hour
full now 70-80*
Showed roaring, crackling
sounds.

On test insulation had fallen
to 120,000 ohms.

Took in and found break down
in joint.

Weather now very rough.

10/16/17.

Tests for Noise.

Put new 1000⁰⁰ receiver, which with joints had been in sea water 12 hours, overboard and connected to input of audions. Showed noise. Test showed more than 1,000,000 ohms resistance.

Connected Bell Receiver with diaphragm off to input of audions. Showed noisy crackles.

Next checked B battery. Found one cell rusted at connectors. Other connectors loose and dirty. Wire connections loose and dirty. Wire of fourth stage to output encased & loose. Soldered, tightened & cleaned up connections. Noise disappeared.

Again put pressure overhead
connected to input. Showed
quiet except for wave noise.
Very sensitive with B² Bell.

Put this in small wood
model. Did not balance well
stood tail up about 30° in water.
Went out with Hydraulic.
In towing, moved dive &
dant vertically.

Brought in and changed
rear horizontal fins.
Dived to bottom and broke
off copper front fins.

Brought in and took off
front fins and balanced
weights so she balanced
in water.

Now towed very nicely at
from 100 to 400 ft.

Connected to input of audions.

Noisy on low speed
Noise at high speed.

This model has cracks in
it and is not perfect. We'll
make noise tests in model
more should have ready
tomorrow.

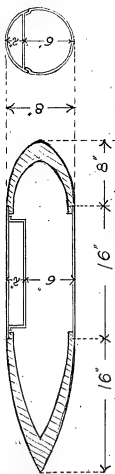
Had Jim Burns tape first
40,000 ft of USAF wire
so that when model dunes
to bottom, insulation will not
be dragged off.

10/17/17.

Paint dry on Moore's Model 4.
Brought edw to balance up.
On floating in water found nose
too heavy. Tried towing. Pulled
too much.
Took lead out of lower part of head.
Balanced better.
Moore took back to Head and Chutes
to balance with his micro phone
w.

Worked on Model 3 (made in
laboratory). Air tank leaked. Had
to solder up and test several times
to get OK. Will take out tank
with integral with body and replace
with separate tank which will have
3 advantages -

- ① Less weight particularly on top
where weight isn't wanted.
- ② Easier to make watertight because
easier to get at.
- ③ Probably not be as subject to
break because being separate from
body not liable to be cracked by



strains to body.

This was equipped with pair of $\frac{1}{16}$ " galvanized iron tails, full sized diagram on next page.

No front fins used in this test.

Receives sound insulated with rubber sponges.

Preliminary-

Resin and joints then tested
out after immersion in water.
Showed more than 1,000,000 ohms.

L of Rear Fins
#3 Rodal

Section Under Mast

⑧
10/17/17.

Towing and Rise Tests, #3
Model.

no front fins used.

- ① Rear fins left straight. 200 ft
USA. Rised wire let out
Dived too deep. Pull too great.
Model evidently towing nose
down
- ② Turned rear horizontal fins
up so as to throw nose of
model up



With 200 ft wire out, pull
has lifted model same to
surface

- ③ Reduced upward tilt of rear horizontal fins somewhat.
With 200 ft line, model still comes to surface.
- ④ Still further reduced upward tilt of rear fins.
With 200 ft line rode well at half and full speeds.
With 400 ft rode well at full but went to bottom with half speed.
- ⑤ Bent these fins back about as ③.
Rode well.
400 ft. wire out:
Rode at half speed (5 mi) = 30 ±
" " full " (10) = 60 ±

Then connected this to input of audions. Very noisy.
Rushing noise like torpedos.

Then connected Bell receiver diaphragm off to input of audions. Audions quiet.

Then stopped hydraulic, pulled model in and listened. Model was now on surface. Noise of waves very prominent.

These tests as compared with previous on #2 seemed to show—:

- ① That the broader rear fins of Model #2 are better than the narrow fins of #3.
- ② That no holes are required for combs to enter these models to reach the rearward. These combs must travel through the sheet iron boxes under water.

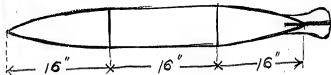
Note

10/18/17

⑨

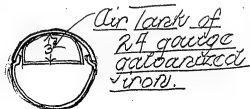
Change of Rose on #3 Model.

Believing that one trouble with #3 model yesterday was too blunt a nose, changed model #3 so as to give sharp nose. This model now measures.



Using the same narrow red fins of yesterday.

Danley made new separate tank for this. This tank is made of #24 gauge galvanized metal and is 3" deep



Mounted out with hydraulics.

① - No bow fins. 200 ft
USA Field Mine.

At Half Speed (abt 4 mi per hr) 5#
" Full " " 9.5" " " 30-35"

Pull satisfactory light but
not as steady as desired.

Connected up to input of
audions.

Noise much better than
before, a combined roar with
sound as of vibrating of
gubbers - crackling. This
however is great improvement
over any thing previous,
except the old wooden model
with peel.

② Then let out 500ft wire
Pull at half speed abt 4.5 mips. to 52"
" " full " " 76. " " 50-60"

At half speed seems to ride evenly. At full speed, jumps somewhat as indicated by varying pull.

Connected to input of audions. At half speed fairly quiet. At full speed quite noisy - much more so than with 300ft.

Indicates that the model is not riding level & even.

Apparently model was diving too deep. Turned back fins to make dive less deep. Came to surface.

Again adjusted these rear fins. Model began jumping as indicated by intermittent

pull.

Harley then put on pair of
bow fins. Model still
jumped.

Decided to change rear fins
to broader ones like #2
model says to hold more
fatigue. This will be done
tomorrow and try out
tomorrow.

CHJ

9/19/17

(10)

Further towing tests with
Model #3, using pivoted
loose.



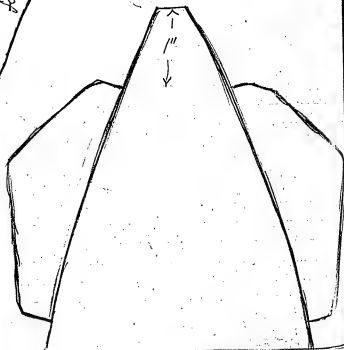
Based on experience of yesterday changed rear fins to shorter and longer ones, same design as used on Model 2.

While going out to Gardiners Bay on hydraulic, made some speed and propeller revolution tests as follows—

A. Average R.P.M.
Steam pressure
1 mile in
Miles per hour

127.
175#
3 min. loose
6.9

Actual size of
first fins used.



B. Average R.P.M.	160
" steam pressure	150#
1 mile in	7 min 27 sec
miles per hour	8.06
C. Average R.P.M.	188
" steam pressure	160#
1 mile in	6 min 10 sec
miles per hour	9.7

Tested Model 3 with sharp
head and long tail fins

Weather Very Rough. High wind
In Glavin Bay, waves
fully 2 1/2 to 3 ft. White Caps.

- ① 200ft U.S.A. Fuel wire out.
Fuel Speed (abt 95 mi per hour) 35#
Pull =
Connected to Input of Audions
Noisy. More than yesterday.
Used front fins shown on
opposite page.
Front fins on center line of
nose and straight.

② Then tilted front fins trifle
so as to bring back up.
With 200 ft wire pull = 30#
Quite quieter than before but
still noisier than yesterday. Can
distinguish engine noise.

③ Let out to 400' wire
Pull = 50#
Not quite as much noise as

③. Can not hear engine as
plainly. Still too much noise

④ To be sure of audions put
pull required to connections
to model.
Audions tested O.K.

⑤ Removed front fins
200 ft wire pull = 30#
Quite quieter than before.

⑥ 400 ft wire pull = 50#
Quieter. This is the quietest
to day and compares favorably

with yesterday.

Note Listened in on this at
slow speed (about 5 miles
per hour) and then, speeded
up to about 10 miles.
Noise increased as soon as
engines started, before speed
of model increased showing
that at least a part of
the noise was from the
propeller as it did not
show periodic engine thrusts.

⑦ Turned rear fins to send nose
of model up. 55#
400 ft wire, pull =
Model showed intermittent
noise. Came to surface of
troughs of waves.

⑧ Turned rear fins again to
practically straight. 45#
400 ft wire, pull =
Quieter than before.
Believe it is as good as
yesterday.

- ⑨ Let out 800ft wire -
Pull = 65 to 75# with waves.
Listened in. At first loud crackles
at intervals but between these,
comparatively quiet.
Had speed of boat reduced.
Noise correspondingly
diminishes.
Again speeded up boat. Could
plainly hear acceleration
of engines. No crackles.
Pull increased to 80#
proving that model was
going deeper.

This is encouraging as the
day is very rough

Took model out of water.
Found air chamber crushed
in. This accounts for crackles
(air bubbles getting out) and the
increase in pull.

- ⑩ To see if the wire ~~it~~
makes noise, short circuited
ends & properly insulated and

elt out 200ft.
Audions show quiet.

10/20/17.

Burns and Hanley left for
Orange.

Made speed test on hydraulic

Steam pressure 170*, Rpm = 72
" 160, Rpm = 66, 66, 66, 64, 62
1 mile in 17 min 30 sec
= 3.4 mi per hour.

Pressure 160, 127, 134, 136, 137, 137
1 mile = 8 min 15 sec
= 7.25 mi per hour

Pressure 145*, 147
150*, 148, 150
155*, 154.
1 mile = 7 min 40 sec
= 7.9 mi per hour.

Pressure 150*, 179, 180, 180, 180
1 mile = 6 min 15 sec
= 9.6 mi per hour

Pressure 150[#] - 185, 186, 186
1 mile = 6 minutes, 0 sec
= 10 miles per hour

Pressure 190[#] - 202
210[#] - 211
210[#] - 212
1 mile 5 min 50 sec
= 10.3 miles per hour.

Curve of this phase straight
line to 180 P.M. Then
falls off

To do next week -
Make new air chamber.
Use #3 make with 2000 ft
wire & take out to
torpedo range

Test out Marie's microphone
in model

Charge B. Batteries.

10/23/17.

Hanley and Burns not yet back.
Moore back at work this morning.

Get cork from Eastern Ship. Co. With
Frank took to small chop new R.P.
station to work up to float for shaping
to float for model #3.

Moore came over and assisted.

In afternoon took Moore's model out
for test. He had balanced this
carefully so that it was level
in water, stood about 1" out with
instrument in.

(11)

Towing Moore's model with
U.S.A. Tels Wire behind Hydraulic

A = 200' wire. Tows steady and
well under surface.
180 R.P.M. = 9.6 mi per hour
Pull = 25#

B. = 400' - Tows Steady
40#-50# pull (waves)
@ 9.6 mi per hour. 180 R.P.M.

C. = 800' - Tows Steady
80# pull.
@ 9.6 mi per hour 179 R.P.M.

D. = 1500' - Tows Steady
170# pull
@ 9.6 mi per hour 180 R.P.M.

E. = 2000' - Tows Steady
230# pull
@ 9.8 mi per hour 185 R.P.M.

When pulled in found it had dragged bottom due to stopping as bottom of instrument was scratched and wire abraded, also had seaweed and kelp on nose.

Wire was twisted in direction of regular twist. (Twisted pair wire) showing that the model had revolved. Believe this was due to kelp on nose. (117)

line air chamber nearly full
of water, showing bulge out.
Other collapsed in.

Allowing about 6* per 100 ft
pull of wire and 20* pull
of instrument, the calculated
and actual readings were
(deducting 100 ft in each case
for amount of wire in air)

	actual	calculated
200 - 6+20	25	26
400 - 18+20	45	38
800 - 42+20	80	62
1500 - 84+20	170	104
2000 - 114+20	230	134

This rule does not work
out exactly probably because
at the longer stretches the
weight of the wire carries the
model further down and the
angle of the wire to the
water is increased.

Believe the collapse of air
tanks occurred about the 800'

pull or when we stopped
to let out 1500 ft.

10/25/17.

Burns back last night

Bad blow night of 23d and almost all day 24th. Rampant anchored in Harbor bed until about 10 am 24th. Because of turning seaward to wind, pulled her anchor loose and went in to Eastern Basin whp. Bldg. Co dock striking corner of a barge.

He tied her up and though she pounded severely, her thick plankers held.

Damage seems to be done where she struck corner of barge and starting seams above water and paint knocked off. We got off lucky as the wind must have been close to 80 miles per hour.

Moose is making cork floats for his model. Hanley and Burns

charging 3 Batteries, putting and
smoothing up wooden heads
of #3 model, testing and cutting
off wire damaged in towing.
Moore's model, getting model
3 balanced with new cork float,
testing, insulating and mounting
recorder in #3 model. Will
try and get ready for test
tomorrow.

Test of Weitzers
Receiver.

This was put in buckets of
sea water 10/18/17 and
tested 7100,000 ohms.

On test yesterday 10/24/17 showed
only about 200 ohms

The magnets of this were
washed with oil, were and
given 1 coat of Sterling Varnish
and baked. Then filed with
Chatterton Compound.

(12)

10/25/17.

Test of Moore's Microphone
in Model #4.

Weather - Calm, quiet except
last 4 or 5 readings when
it began to blow up a
little.

Connected up Moore's
Microphone to input of 1
Stage audion.

① Hydraulic stopped. Put
outboard and ducked out.
Could hear waves sloshing
it and rolling it.
Rang bell to test sensalium.
Could hear bell but not
as loud as with Bell
Receiver and 4 Stage
audion.

② Put out on 200'. U.S.A. Fuel Mtr.
Stopped engine. Slight intermittent
CND

400' - 15 mile basis = 43.5#
1000' basis = 109#

noise. Tested with bell. Could hear faintly.

Half Speed 94 R.P.M.

Noisy - bubbles, crackles and roar of rushing water. Had a peculiar blup, blup, regular, periodic sound, 3.2 seconds apart.

Full Speed = 180 R.P.M.

Very noisy. Alternately came to surface and dived.

(3)

400 ft.

106 R.P.M. = 6 mi per hr.

Pull = 20# steady.

Noisy. Steady rushing sound.

180 R.P.M. = 9.6 mi per hr

Pull = 40# steady.

Noise increased and changed but not until boat accelerated showing that this noise was due to speed of mobile through water and not to engine.

600 ft - 10 mile bars = 74#
@ 1000' bars = 173#

(17)

600 ft.

72 R.P.M. = 3.9 mi per hr.

Same steady pushing noise
as before

169 R.P.M. = 9. mi per hr

Pull = 60#

Increase of pushing noise.
After speed has increased.

(5)

800 ft.

124 R.P.M. = 6.7 mi per hr

Pull = 40#

All noise and sound
gradually died out. Tested
1 stage audio with Bell
Receiver as transmitter on
input. Is O.K. Trouble
therefore with the
microphone.

On taking out found small
amount of water inside
covering all surfaces
including the carbon
contacts. This seems to be
from capillary seepage.

(18)

10/25/17.

Test of Model #3 with
Cork float.

Made cork float for model #3 in place of air tanks which collapsed. This worked O.K. Held the model nearly an inch more out of water, showing greater buoyancy and did not collapse when sunk.

Receiver insulated with Gutta-Percha which had stood up for 8 or 9 days full down-resistance only 200,000. Put in a receiver insulated with beeswax and rosin which had stood in pail of water for 4 days.

Preliminary Test.

Connected to input of audions, hydraulic stopped. Showed metallic noise of waves

400 ft - 10 mile bars = 58.9*
@1000' " = 147#

hitting iron body of model.
With these showed good and
sensitive.

Ran at low speed. Noise
diminished from surface
noise due to lack of banging
by waves. Noise almost
ceased. Very slight. But
noisy as speed reduced
to 0 and it came to
surface.

Increased speed to $\frac{1}{2}$
noise diminished.

Increased speed to full.

Noise diminished to certain
point then increased.

- ① 400 ft U.S.A. Field No.
 $\frac{1}{2}$ speed = 94 R.P.M. = 5 mi.
Pull = 20# steady
Increased engine speed. Noise
increased before boat
got up to speed
100 R.P.M. = 9.2 mi per hr.
Pull = 50# steady.
Ideally engines. Some rushing
noise.

600ft - 10 mi basis = 72#
@ 1000' basis = 120#

Then stopped engine. Noise also stopped before speed of boat diminished much. Had engine started. Noise came up before speed of boat changed.

② = 600ft
R.P.M. = 100
Pull = 25# steady.
Less noise than ①. Can hear engine plainly.
R.P.M. = 168 = 19.1 mi
Pull = 60# leaky.
Noise louder than full speed in ①. Seems to show that the balance of instrument at 400' is best.

③ 800' ft.
R.P.M. = 1112 = 6 mi per hr.
Showed intermittent noise and scale jumped proving striking on bottom or other intermittent resistance.
Pulled motor in to examine.

400 ft Cork floats - 10 mi hours 50#
@ 1000' beam = 125#

- ④ Turned rear horizontal fins up slightly so as to keep nearer surface.

200 ft = Stop quiet.

R.P.M. = 124 = 6.6 mi per hr.
noise increased slightly
Hear engine.

RPM = 180 = 9.8 mi per hr.
Intermittent noise. Comes
to surface & dives.

- ⑤ 400 ft. Cork floats on wire
at 200' & 300'

68 R.P.M. = 3.6 mi per hr.
Pull = 12.5#

Very quiet. Hear only engine
noise and that plain

168 R.P.M. = 9.0 mi per hr
48½# steady pull.

This is good. Corks have
diminished rather than
increased pull.

400ft - 10 mi bars = 51.6 #
@ 1000' bars = 129 #

600ft - 10 mi bars = 85.2 #
@ 1000' bars = 142 #

- ⑥ Then increased corbs so as to have at 200'-250'-300'-350'

400 ft

106 R.P.M. = 5.5 mi per hr.

20 # = steady pull.

Steady noise. Heard engine.

180 R.P.M. = 9.6 mi per hr.

45-50 # = pull, not steady.

Showed intermittent noise.

Comes to surface & dives.

Good shows we can control depth at greater distances

- ⑦ - 600 ft. Additional corbs every 50'

173 R.P.M. = 9.4 mi per hr.

75 # = steady pull.

Noise increased. Rattles.

- ⑧ Back to 400' to determine

trouble

at half speed very noisy showing something had happened.

Pulled in. Motor had nose full of seaweed and kelp.

400ft - 10 mi base = 52.3 #
@ 1000' base = 131 #

600ft - 10 mi base = 83.3 #
@ 1000' " = 139 #

800ft - 10 mi base = 100 #
@ 1000 ft base = 175 #

⑨ Cleaned off.

400' with corks each 50'
128 R.P.M. = 6.6 mi per hr
30 # pull, steady.

Very nice & quiet. Hear
engine plainly
172 R.P.M. = 9.3 mi per hr.
45 # = pull steady

Noisy. Came to surface. Good

⑩ 600 ft. corks each 50 ft.
98 R.P.M. = 5.3 mi per hour
27.5 # = pull steady.
Quiet
178 R.P.M. = 9.5 mi per hr
75 # = pull steady
Quiet

⑪ 800 ft. No more corks.
104 R.P.M. = 5.6 mi per hr
40 # = steady pull.
170 R.P.M. = 9.2 mi per hr.
85 # = steady pull.
At 104 R.P.M. almost all engine
noise. At full speed still hear
engine, but other sounds
also. Had engine stopped

1000 ft - 10 mi base = 117 #
@ 1000' " = 117 #

600 ft - 10 mi base = 87.2 #
@ 1000' " = 145 #

While noise was up, still some noise

- ⑫ - 1000 ft. No more cobs.
130 R.P.M. = 7 mi per hr.
60 # = pull
Increased noise. Crackles.
182 R.P.M. = 9.7 mi. per hr.
110 # = pull.

At first noisy & pull varied
between 100-180 #. Then quieted
down and pull showed 110 #
steady.
Still extraneous noise at more
than 600 ft.

- ⑬ - 600 ft - same as ⑫
118 R.P.M. = 6.4 mi per hr
32½ # pull = steady
172 R.P.M. = 9.3 mi per hr.
75 # pull = steady
Noises both at half and
full speed than ⑫. Something
wrong.

Test showed Resistance to ground
= 145,000 ohms. This proved to

be in joint.

10/27/17

Galvanometer for bridge gone bad
so can not test resistance.

Put corks in tops of nose & tail
of Model 300 as to increase
buoyancy.

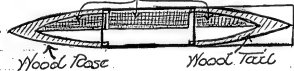
Put in reserves (water resin insulation)
and connected up.

Shows very quiet on aultions
but can hear bell plainly &
with all overtones.

(14)

Test of Model #3 with corks
is for extra buoyancy.

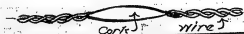
Corks for buoyancy



Wood Nose

Wood Tail

Detail-fairing cork
floats on U.S.A. wire.



C1453

- ① 600 ft. wire. Corks at 100, 200, 300, 400, 500.

At half speed, noisy. Rushing
crackling, bubbling noise.

Stopped engine. Noise continued
with speed of boat.

Full speed

174 R.P.M. = 9.4 mi. per hr.

60# pull = steady

Still very noisy.

- ② Then took all corks off to
get conditions of yesterday.

124 R.P.M. = 6.7 mi per hr.

Still noisy. Can hear engine
but there are additional
noises.

166 R.P.M. = 8.9 mi per hr.

Still noisy. Noise changes
and increases with speed.

- ③ Put corks back again as ①
98 R.P.M. = 5.3 mi per hr. 45#
While speed was increasing
from 0 to 5.3 mi per hr.,
there was a time, lasting a

few seconds when extraneous noise died away entirely and the engine sound was the most prominent.

172 R.P.M. = 9.3 mi per hour
105# fuel first = steady
120# " " = "

As above, at an intermediate speed between half and full, there was a point lasting a few seconds where there was very little extraneous noise.

This no noise point appears to occur only during a change in speed and not at any fixed rate of speed. It seems to occur then when in the process of getting a stable position for towing, the model has gotten into some position where there is least friction or resistance or swirl or whatever, it is that produces this noise.

④ - 1500 ft wire - 14 cork floats.
At low, uniform speed, about
2 mi per hour, very noisy, shad.
123 P.M. = 6.9 mi per hour.
95# pull = steady.

Noisy
While accelerating to full speed,
model came to surface & was
noisy.

180 P.M. = 9.6 mi per hour
155# pull = steady.

Noisy.
Then dropped back to
intermediate speed to see if
different -

150 P.M. = 8.4 mi per hr
125# pull = steady

Still noisy

Pulled model in. Found long
piece of kelp on nose.
This would destroy towing
equilibrium and make
noisy.

- ⑤ Let model out 400ft
and observed at various
speeds from towed boat.
124 RPM = 6.7 mi per hr.
30# = even
174 RPM = 9.3 mi per hr.
50# = even

At lower speed towed bow
up but at lower speed would
ride perfectly level. This
seems to confirm listening
in experiments where it
sounded best at an
intermediate speed. The
model probably was running
on even keel and with least
eddy currents at this speed.

Then bent the rear horizontal
fins to perfectly level and
again observed. Same
results. Dumps at changing
speed for a few seconds.
Noisy at fixed speeds.

These experiments seem to
indicate that extra work

produces an class buoyancy
and that ~~the~~ the extra pull
necessary to keep model under
water produces surfs which
make the noise.

~~146 P.M. = 7.7 mi per hr.
50# pull - steady
noise
170 P.M. = 9.2 mi per hr.
50# pull - steady
noise~~

- ⑥ Extra corks removed from
nose and stern.
400ft wire. Cork floats
every 50 ft
146 P.M. = 7.9 mi per hour
40# pull = noise
170 P.M. = 9.2 mi per hr.
50# pull = noise.

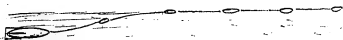
- ⑦ Then changed cork floats to
every 25ft apart
172 P.M. = 9.3 mi per hr.
50# pull = steady.

at half speed rhythmic clicking
in with other noise. at full
speed, same rhythmic clicking
but more rapid. Extra cork
floats evidently making
broad ride steamer surface
and these clicks are
ripples.

- ⑨ Then took off the 25 ft
floats leaving only at
50' intervals
116 R.P.M. = 6.3 mi per hr.
30# pull = steady
noisy
167 R.P.M. = 9.4 mi per hr
50# pull = steady
still noisy.

- ⑩ Again put back 25' interval
floats to try effect
118 R.P.M. = 5.9 mi per hr.
25# pull = steady
165 R.P.M. = 8.9 mi per hr.
50# pull = steady.
Both noisy.

Hanley went back in
row boat and found
following floating.



He then made several trials
and balanced model.

Noise much reduced
pretty good.

While at this adjustment
~~determined to feed it and~~
~~try out with torpedoes Monday.~~

1.3
5.2

Photostat for
better circuit
Try 3 stage audion
Long Martin

10/29/17.

Tests with Model #3.

Connected up #3 model with
Bersaw & Rosin insulated receiver. Tested
out. Is very quiet.

Resistance test to ground shows
only 200,000 ohms. This is bad but
testing conditions are too good
to miss.

Put out bee in row boat. While
under way at about 5 miles per
hour could hear bee plainly
at 200 - 300 yards.

Went to Gardiner's Bay and
ran parallel with torpedo
course to get torpedoes.

At 1:36 P.M. audion quiet.
Found however that current
through the filaments was low
and that this made the circuit
unusually quiet. Put on
new battery and brought

filament current to 1.3 amp.
 at 136 R.P.M. = 6.4 mi per hour
 somewhat noisy. at 106 R.P.M.
 = 5.6 mi per hour, somewhat
 quieter. Cut down current in
 1-2-3 stage audions. Became
 then fairly quiet.

more put his instrument
 overboard also.

(15)
 Test of #3 Model with
 Nats and Posis insulated
 Receiver



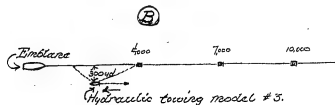
400 ft of wire out. Cords at
 25' 50' 100' 150' 200' 250' 300' 350'
 Speed = 110 R.P.M. = 5.8 mi per hr.
 First heard torpedo at 500-600 yds.
 Loud " 800 yards.
 Heard to 700-800 yds.

Based on these, telegraphed
as follows:

T.A. Edison, Civil Board Bn, Navy
Washington, D.C.

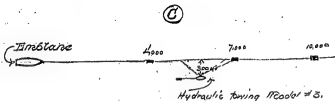
First test on range heard torpedoes
plainly five hundred yards three
trials while under way six miles
per hour towing Beel model at
few hundred feet. Heard with
microphone model also. Sea
Rough

Am Kennedy.



Same length wire and corks
as (A).

Speed = 112 R.P.M. = 6 mi per hour
First heard torpedo at 500-600 yds.
Herd at 300 "
Heard to 1000 "



Wire and corks same as (A)

Speed = 130 R.P.M. = 7 mi per hr.
First heard torpedo at 600-700 yds.
Herd at 300 "
Heard to 1200 "

Very Encouraging.

Weather, Tangle, Bounce, Wreck, Cops.
So rough that Emblane came in.

⑩
Variations of Noise with Speed.

① 200' - Cuts 25-50 and each 50
96 R.P.M. = 5.2 mi per hr.
Junt at first. Became noisy

② 400' - corks each additional 50'
98 R.P.M. = 5.3 mi per hr.
Less noise than above

③ 600' - corks at each additional 50'
102 R.P.M. = 5.5 mi per hr.
Less noise than above. Engine plain

④ 800' - small corks each additional 50'
100 R.P.M. = 5.4 mi per hr.
Very noisy. Must be looking bottom

⑤ 800' - as above
142 R.P.M. = 7.7 mi per hr.
Much quieter than above. Can hear engine.

F-800' - small corks each 25' after 600'
82 R.P.M. = 4.5 mi per hr.
Junt. Good

⑥ As above 130 R.P.M. - Noisy

⑦ As above 174 R.P.M. Increased noise

⑧ 200' - corks at 25'-50' each 50' after
178 R.P.M. Junt noisy.

10/20/17.

Blow yesterday afternoon increased and developed into storm and rain which lasted all day.

Shaffner came last night. Spent day with him going over apparatus, and situation concerning the Rampant.

Hanley tested out joints. Found resistance about 200,000 ohms. Made new joints. Also made drawing for 6" cross-section towing model.

Burns made another air tank for Bus. Receiver so that we could have spare one already set up.

Shaffner left 2:50 for Chicago to get list of new material wanted.

10/31/17

Further Tests of #3 Model with
torpedoes.

Weather: ⁽¹⁵⁾ First torpedo (3)
Calm. Others came under
white caps. Waves about 12".

Missed first torpedo. Too noisy
and too sensitive. Stanley
thought he could just detect.
This was taken at full speed.
180 R.P.M. and with all audion
tubes with full current 1/3 amp
through filaments.

Reduced filament current of
the first 6 stages and speed
to 112 R.P.M. = 6 mi. per hr.

①



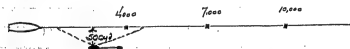
Torpedo fired. Ran straight almost to 4000 yd point then turned and went back toward airplane.
Moore states that he heard this. Impossible

②

While waiting for next torpedo to be fired tried resonating speaker on audions in place of head receivers. Found that at 98 it made the noises louder - being a resonant point probably for the audion circuits.

③

Weather Calms:



600 ft U.S.A. field wire with
 grades at 25-50-100 every 50 ft
 hereafter.

Speed = 130 R.P.M. = 7 mi per hr
Hanley listening
First heard torpedo at 2000 yds.
Foudest 500 "
I heard to 3000 "
This seems too good to be true.
Hanley reiterated that he was
sure of his results.
More heard this -

Audions then became more
noisy. Pulled model in and
could find nothing wrong
except seaweed on corks.
Put in water again. At first
quiet but soon again became
noisy. Experimented with
current through filament of
audions and found that this
noise varied as the current
through the filament of
the 3rd Audion. This is the
one having the grid charging
battery removed. Varied
current of this until circuit
was sensitive but not
noisy. Also reduced potential

of B battery from 144 to 130
Volts.

Tried again speeding up to
180 R.P.M. = 9.6 mi. per hr.
model becomes noisy around
this speed and unfortunately
the noise is a screaming
whistle very similar to the
sound of a torpedo. This
shows that our model
must be further refined
for high speed.

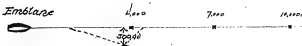
- ④ Weather little rough. Some
white caps. About 12"
waves.



Mrs. came as ③
Stanley listened. I confirmed.
Speed = 120 R.P.M. = 6.4 mi. per hr.
First heard torpedo at 2000 yds.
Loudest 600 "
Heard to about 1500 "
Moore heard this also. I confirmed.

⑤

Envelope



Hydrolic Towing Model #3.

Same wire and coirs as #3

Hainley listened I confirmed.

First heard torpedo 2000 yds.

Lowest 600 "

Heard to 1500 "

Weather somewhat rough. White

caps. Waves about 12" high.

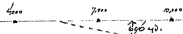
Speed = 140 R.P.M. = 7.5 mi per hr.

None heard this

Model shows intermittently noisy. Am unable to determine exactly why but imagine it collects floating grass and seaweed which disturbs balance and makes it run irregularly.

⑥

Emblave



Hydraulic Towing (Model 3)

800 ft wire out. Cords 25-50-100 and each 50 ft to 600.

Speed = 72 R.P.M. = 3.8 mi. per hr.

We did not know torpedo was coming when Stanley announced that he heard it.

About 1/2 minute after it passed the 7000 yard badge which was 2500 yds from us.

showing that he had heard it about 3000 yards.

Continued to hear until about 2000 yds passed us.

Emblave then went in.

① Speed = 140 R.P.M. = 7.5 mi per hr.
Noise low. Could distinguish torpedo

800 ft wire out

② Same wire.
Speed = 176 R.P.M. = 9.4 mi. per hr.
Noise more. Torpedo like.

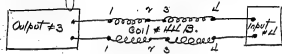
413

Could not distinguish
torpedo at this speed.

It is evident that we will
have to improve towing model
to eliminate noise at
higher speeds.

11/1/17.
Tests of Model #3 for
Noise with torpedoes.

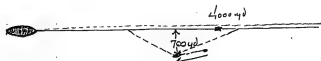
Left Greenport about 7:45 am.
 On way out tried putting inductance
 in audion circuit between 3d
 and 4th stages in attempt to
 lower the electrical frequency of
 the audion circuit so that its
 note in the receivers would
 not be like the high pitched
 note of a Bliss torpedo



This coil had no effect on
 pitch of audion noise.

Adjusted current through
 filaments of 1st, 2nd & 3 stage
 Audion tubes so as to reduce
 noise, paying especial attention
 to the 3d stage which seems
 the most sensitive.

①



400 ft. wire out. Corks 25'-50'
 100 ft. each 50' thereafter.
 112 R.P.M. = 6.0 mi. per. hr.
 Stanley heard torpedo first 1000 yd.
 Fardest = 700 yd.
 Heard to 2000 yd.

②



600 ft. wire out. Corks 25'-50'
 & each 50' thereafter.
 Speed = 102 R.P.M. = 5.5 mi. per. hr.
 First heard = 2000 yds
 Fardest = 100 "
 Lost at 1000 "

Took model in and greased
 with vaseline to see if would
 decrease resistance and
 eddy-currents and noise.
 Seems to have no effect.

- ③ While engaged in fitting out model after this, torpedo was fired which ran off course and came in about 50 yards of us.

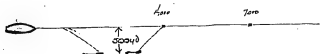
Speed = 74 P.P.M. = 4 mi. per hr.
Stanley and I each having pair of head telephones heard very loud when near and for 3000 yards after it passed us.



Same wire and cords as ②
Speed = 130 P.P.M. = 7 mi. per hr.
Stanley and I both listened in
Torpedo ran off course and
came in 100 yards of us.
First heard at 1000 yd
Foud 100 "
Could hear 2000 "

Audions somewhat noisy.

⑤



Same wire and corks as ②
 Speed = 156 R.P.M. = 8.5 mi per hr.
 First heard = about 1000 yds.
 Loudest = 500'
 Heard to = 1000'

This torpedo was not loud or clear like the others. Very difficult to distinguish. This is not new however as we sometimes had similar results while testing before. Also the higher speed increased noise.

Have not heard to day as well as yesterday. Will try and adjust 3d stage audion as sensitive as possible to stand the noise.

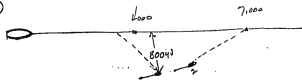
This shows that this method of mounting the Bell Receiver, as transmitter method of insulating ~~and~~ is better than formerly and that the Audions are O.K. and very sensitive.

Steamer Montauk passed 3000 yds off. Heard her engines - Ditchuk - Ditchuk Ditchuk, 95 P.M. Very loud.

This sound however is quite different from noise of torpedos and would not confuse.

Emblau passed going in at 7000 yards. Could not hear easily as well as Montauk at 3000 yds.

⑥



Wire and corks same as ②
Speed = 134 R.P.M. = 7.2 mph.
First heard = about 500 yds.
Loudest (very) " 200 "
Heard to " 150 "

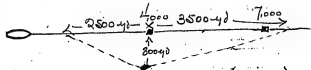
Listened in also with resonator receivers. Thought I could get a response at about 6" but not sure.

This torpedo came to surface with a splash just before 1000 and ran some distance with nose out of water.

Was much louder and plainer than #5.

Took model in and removed cork at 25' to make ride a little deeper.

⑥



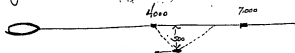
Had Hydraulics stopped and float taken out of model so as to sink it. Model sunk about 12' over stern. First heard torpedo in 15 minutes after left Embalse at 2500 yds from 4000 yds past A about 2625 yds from Hydraulics. Heard for at least 500 yds past 7000 yard screw or for nearly 4000 yds from Hydraulics.

This is much better than one used to hear with old Horn-tripod model although there is more noise from banging against boat.

The sound is clearer & cleaner & better.

Torpedo came by unexpectedly. Neither Stanley or ear phones nor self on resonating receivers detected it. Tried to get resonance but could not get anything definite.

⑦

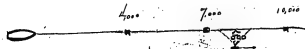


Wire and cork same as ② except cork at 25' removed. Speed = 180 R.P.M. = 9.6 m.p.h. First heard torpedo = about 600 yds. Faintest = 500 " Heard to = 1000 " I listened in on resonating receivers. Could not time or get anything definite with them.

At this speed there are three separate classes of noise

- ① A low frequency, non-periodic Br-br-br-br-br non-musical noise which I believe to be due to eddy currents, either

⑧



Wire and cork same as 7.
 Speed = 180 R.P.M. = 9.6 mi. per hr.
 I first heard torpedo about 600 yd.
 Heard torpedo to 1000 "

It is evident that reducing the sensitiveness of audison to reduce noise is wrong as it cuts down all sound, legitimate as well as noise and that we need as much of the torpedo sound as we can get.

Then adjusted all audison units filament currents to 1.3 amp so as to bring up to maximum sensitiveness.

at the tail or at the intersection of the head piece with the body.



- ② A musical note resonating to about 9" air column. Believe this to be the electrical frequency of the audison circuit which resonates with ① Later results show also propeller noise of hydroplane.
- ③ The higher pitched screeching whistle of the torpedo.

Then reduced sensitiveness of audisons to get rid of noise by this means.

→ fellow opp. pages

For 11/2/17.

- ① Compare 4 stage and 1 stage audions
- ② Shunted receiver & bell test
shunted receiver nearest to
source of sound
- ③ Try 2 stage audion experiment
against 4 stage

Get to P. 69 Switch

- 1 - container for 7000 Ω R f32-1 ac
- 2 - " " " " "
- 3 - Summit Sq. Rlv. f65 = 1 ac
- 4 - Container resistor in road
- 5 - Resistor f16-1/2 ac
- 6 - " " " "
- 7 - Same f32-1 ac
- 8 - model #2 f32-1 ac
- 9 - " 4 ac f32-1 ac
- 10 - Microphone in R f16-1 ac
- 11 - Seal Box Model f16-1 ac
- 12 - Model 4 ac f16-1 ac

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments
J. A. Hanley Books, Nos. 1-2**

These two notebooks were used by John A. Hanley during May 1918-September 1919. They contain notes on experiments with submarine detection, as well as listening devices to detect submarine torpedoes. Hanley reported to Edison on these experiments.

Book # N-Number Labels and Inscriptions on Front Cover

Selected Books

1	18-05-12	"Experiments. Edison Submarine Detector. No - 1. From, May 12-18, To, Feb 14-19 J. Hanley"
2	19-02-15.2	"Experiments. Edison Submarine Detector. No - 2. From, Feb. 14 -19 To "

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments -- J. A. Hanley Books
Notebook, N-18-05-12**

This notebook was used by John A. Hanley during May 1918-February 1919 for experimental notes on submarine detection. The entries deal primarily with the deployment, placement, rigging, and sensitivity of the detector. Also included are tests of listening devices for submarine torpedoes and experiments involving the "quick turning of ships." Some of the experiments were conducted aboard the USS *Sachem* and the harbor steamer *Clio*. The notes indicate that Hanley was reporting directly to Edison and that William A. Hayes was conducting related experiments during the same time. The front cover is labeled "Experiments. Edison Submarine Detector. No - 1. From, May 12-18, To, Feb 14-19 J. Hanley." The pages are unnumbered. Approximately 135 pages have been used.

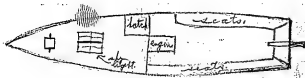
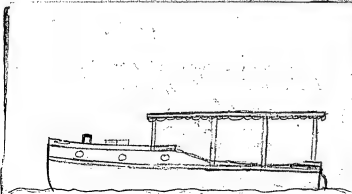
J.A. Hanley
Edison Lab.
West Orange
N.J.

75428
Acme Co.,

MFG. STATIONERS,
96 JOHN ST.
AND
19 PLATT ST.
NEW YORK.

May 12. 1918.

After doing some preliminary experiments at Lab. I decided to hire a launch so we could make some accurate determinations before going on larger boat (Sackem)



May 13, 1918. 1

Description of motor launch Margie.

26 ft. cabin boat.

draught 2'4"

beam 6'

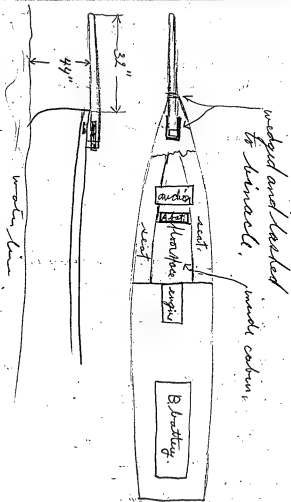
2 cylinder 12 H.P.

Lathrop engine located amidships.

speed about 9 miles per hour. (statute miles)

cabin extends from bow to amidships

canopy over stern from amidships.



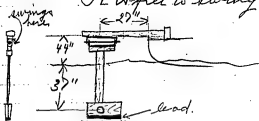
May 14, 1918.

Set up 3 stage audion on motor launch and constructed bowsprit as shown in sketch on opposite page.

Audion was very quiet.

Rigged apparatus containing transmitter from bowsprit, as shown.

It is free to swing to port

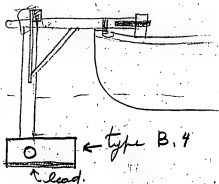


or star board.

Found that I wanted to raise to the surface due to the action of the tide which was flowing at the rate of 1/2 knot per hour.

Added more lead to bottom (about 7 lbs.)

Result the same.



May 15, 1918. 3

Run launch at slow speed
model raised to the surface of
the water.

When stopped it would
come back to the vertical
position.

Found that by holding
in a vertical position with
a stick on back side there
was very little tendency to
raise, but if it got a few
degrees start it was very
difficult to hold it.

Constructed braces to
hold model in a fixed position
as shown on opposite page.

While laying at dock
tested instruments.

Res of transmitter 72"
" " ground 1000000"
and on very quiet
apparatus also very quiet
heard tug over one mile
down the river.

Run launch out at

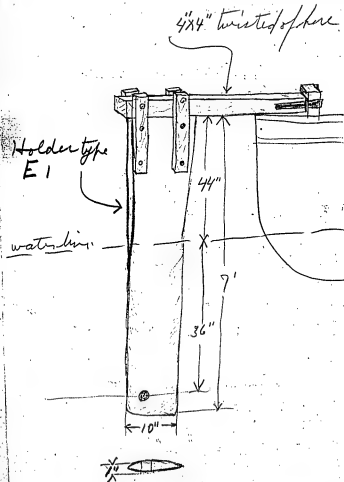
4
a speed of between 4 and 5
miles per hour.

Model wanted to raise
to surface
almost twisted brought
of binoculars.

listened in while it
was riding at an angle of about
45°. was very quiet, as
as when remaining still

Did not increase
speed for fear of breaking
apparatus

Found that the
ignition system has an inductive
effect on motion
There is a click in
receivers when plugs spark



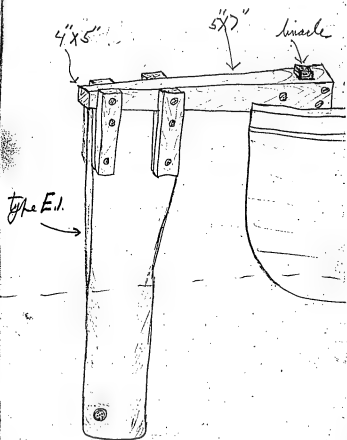
May 17, 1918

Constructed and rigged up
new apparatus as shown.

Tested and ion found OK
Tested res.
void 73" ground 10000000"

Tested apparatus through
and ion while remaining still.
very quiet. Hoyer and Burr
confirmed

Run out with launch
at slow speed. when making
a short turn 4x4" bowprit
twisted of at point indicated
by arrow.



May 18, 1918.

Made new bowsprit
and rigged spar shown.

Quite windy and water
very rough.

Run out launch and
apparatus towed A.K.
Boat pitched and rolled
considerable without any
undue strain on rigging.

Listened in, seemed
very quiet, outside of the
inductive interference
which is much more pronounced
when engine is running
on batteries than on a g.e.t.o.

It is impossible to
eliminate this interference
entirely due to the location
of engine and the size
of boat, which necessitates
a distance of inductive range
between and/or and engine.

This holder makes a
decided difference in the
steering of the boat.

Boat turns very hard.

May. 28. 1918.

Tested transmitter preparatory
to making running test.
Found that iron diaphragm
touched magnets.

Put in new transmitter
and tested res.

Coil res. 71"

Ground " 10800000"

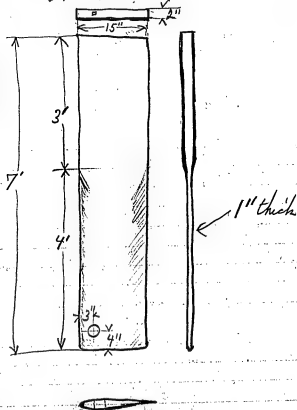
Audion very quiet and
sensitive.

Listened in with apparatus
and heard water bubbling
noise. The water was a little
what rough.

Could hear tug boat to
very plain over 1 mile while
remaining still.

Could hear bell with
overtone very clear for
1/2 mile while remaining still.

Constructed new holder,
Type F No. 1.



Transmitter inserted in hole
with rubber 1/4" thick surroundings and

Test No. 1. Holder E, 5/22/18

Auction very quiet and
sensitive.

Tested res. of transmitter
wires. 6 1/2"
ground broken down.

Disassembled holder and
examined transmitter.

Found water in transmitter.

After repairing and
rigging up again, tested res.
wires. 7 1/2"
ground. 100000 or

Apparatus very quiet
when boat is remaining still.

Started engine, did not
interfere except a slight click
due to the induction (Cognifire)

Got very noisy as soon
as boat started.

Very bad water noises
accompanied with boat noises
it would be impossible

to hear anything above the noise
(Boat was run at full speed)

Run launched at top of ca. and
shut engine off.
Noise diminished quite
a lot, but there was water noise
left, which died down as the
boat lost momentum.

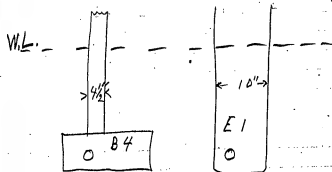
Apparatus seems very
quiet when engine is running
free, showing that there is
very little noise transmitted
to instrument through boat.

Gets very noisy as
boat gets under way.
Poor stream line form
of holder E1 may account for
this.

The noises described
above were not experienced
May 15, when using holder B4.

This may be due to the
difference in amount of surface at

the water line, as shown
here.



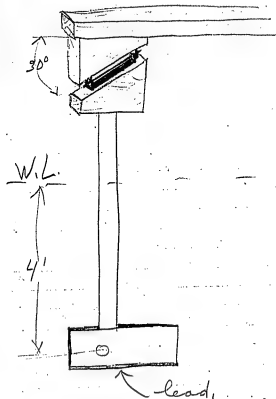
Test No. 2.
Holder F1.

5/23/18

After rigging up F1
and testing res, found the
ground. It broken down in
the coil res about 9".
Due to a defect in the
insulation.

Made run test to learn
riding conditions, rides OK,
but makes steering harder
than with E1.

Could not hear any ^{thing}
due to the short circuit.



Test No. 3,
Offshoot B.4.

5/22/18

B4 holder suspended
at an angle of 30° as shown
on opposite page.

Seemed to ride well
going slow, but as speed
was increased to 607 miles
per hour would raise to
the surface.

There was no transmittance
in B4, while used in this test.

The test being merely
to determine the practicability
of utilizing this principle.

The angle of suspension
may not be great enough.

5/23/18.

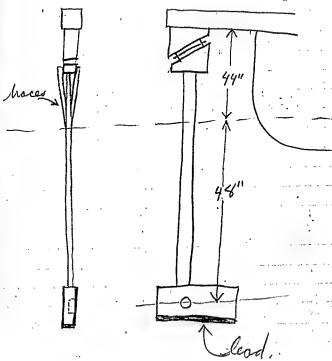
Found trouble in E.I. holder to be due to one of the wires being severed in the insulation.

Repaired and rigged up again and made run test.

Launch engine would not run on magneto and there is a great inductive interference when running on battery due to the ignition coil.

Water noises not so great as when using E.I. holder.

Looked over magneto and found spring broken



B4 holder.

Test No. 1.

5/24/18

Repaired magneto on launch engine.

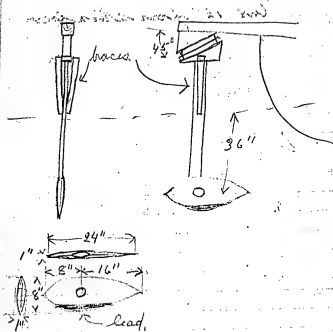
Made test with F1 (15) holder.

Water noises present but not as much as with E1 (10)

Test No. 2.

Rigged up B4 at an angle of 45° as shown in sketch. $\frac{1}{4}$ " thickness of rubber around transmitter.

It would ride O.K. and remain vertical while going very slow, but when speed increased to 4 or 5 miles per hour it would dart to the surface and go back to the vertical and vice versa due to the flexibility of the stick and the depth of it in the water.



dimension of type G. No. 1. model

Cut 12" from stick leaving
36" in water

Results the same, noise,
Went from side to side
twisted of bowsprit.

Test No. 2.

Rigged up fish tailed
model designated as type
G. No. 1 (as shown in sketch)
45° angle.

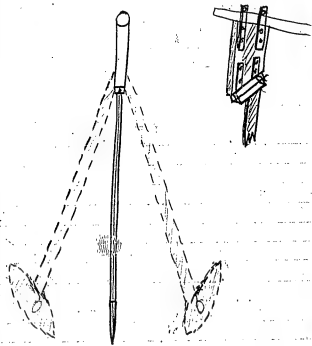
Results were fine.
Would ride beautiful
and remain vertical at
all times, and at all speeds.

Turning boat has no
effect on it.

Rocked boat from
side to side, no effect.

No apparent strain
what ever.

Effect of angular suspension



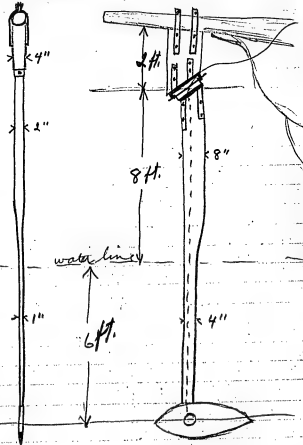
Listened in morning
at full speed could only
hear our own boat noise
that engine off while
going at full speed.
Very quiet.
Absolutely no water
noises.

Listened for full
could hear going at a low
speed for about 1/4 mile.

Induction and boat
noises down it going at
full speed.

Engine in launch runs
very good now since
magneto was repaired
and there is greater induction
interference than before.
When running at full
speed this induction is felt
and is entirely.

Description of G. 2. apparatus
on Sachem.



Description of G. S. S. S.

June, 7, 1918.

Suspended G. S. S. from
bowsprit of Sackey, as shown
in sketch on opposite page.

Seemed to hang vertical,
tide was running at the rate
of 1.9 knots per hour.

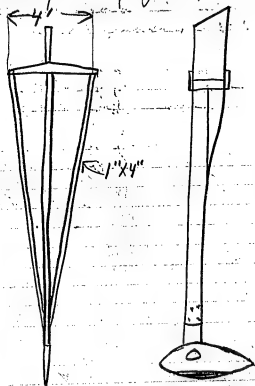
Listened in could hear
all kinds of boat noises,
Lot of shipping going
on. Impossible to get a
quietness for any period
of time.

No water noises.

Transmitter got
water in back of mica
diaphragm

disassembled to repair.

Description of G. 2 apparatus ^{being}



June 11, 1914.

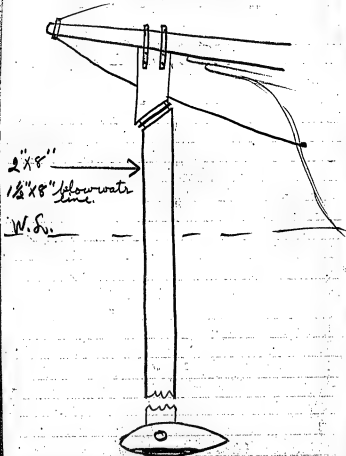
Using G. 2 apparatus on
Sackem and made run test
at 5 knots per hour.

Model would tend to
raise to surface due to
flimsiness of upright.

Did not increase speed
for fear of breaking same.

Braced G. 2 as shown
on opposite page.

New apparatus made to overcome flimsiness of G. 2.
This is designated as H. 1.



Test No. 1.
Time 9:30 A.M.

June 15, 1918.
Hudson River
N.Y.

Tide running out at the
rate of about 2.6 miles per hour.
Water slightly rough.

Suspended new apparatus
as shown on opposite page,
from Sachem.

Tested res. coil 75.5 W
ground 10,000,000.

Run up river at 5 knots
against tide.

No water noises.
Can hear engine
on Sachem. R. P.M. 116

This apparatus rides
beautiful, remains
vertical except when
still. It swings slowly
from side to side, but
gets vertical when boat
is under way.

Increased speed

to 7 knots.

No water noises

Very quiet

R.P.M. on Sackem 128.

Time

10.46

Can hear wireless signal

very faint.

Herald station at
Battery Park.

Run full speed.

Very good, no

water noises at all.

R.P.M. 151 Engine

very quiet.

Turned boat at
full speed, without any
effect on apparatus.

Ridley fine at full

speed. No apparent strain.

Time

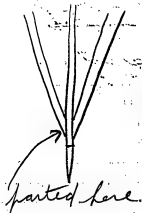
10.56

Going down river
with tide, full speed.

Can hear other ships

but there is no much shipping

going on can't listen for



Tent No 2.

June 15, 1881

suspended braced
apparatus G. 2.

Run at 3 knots.
Side brace broke off
as shown in sketch.

Due to great pressure
at that point. 3 gucs.

June 18.

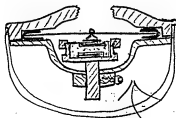
Am constructing the following apparatus for tests at sea.

No. 1. H. 1. apparatus as described.

No. 2. H. 2, as shown on opposite page.

No. 3. H. 3. shown on next page.

No. 4. H. 1.



construction
of transmitter

about 7 times more
sensitive than bell tel
receiver

July 22, 1918.

after experimenting
with various transmitters
we found the ordinary
bell carbon transmitter
carbon replaced with
powdered baculite
(with zeolite) to be
the best.

This baculite is
powdered, through 160
mesh screen and on 180
mesh.

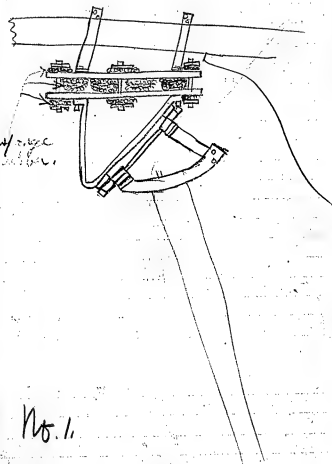
We use 2 cells battery.
This seems to be
very quiet and sensitive
I can hear out to
400 feet as against
with bell tel.

Gasoline is distilled
at 75°C. 74°C.
B.P. 66°C. S.P. 74.3

August, ~~Aug.~~ 13, 1918.

Left Edison Lab. with
equipment; reached
Hooker, loaded gear
and went to St. John's for
provisions for boat, then
proceeded to Sandy Hook
N.J. reached there 7 P.M.
Same date.

Sandy Hook.



No. 1.

Aug. ~~14~~. 14. 18.

Assembled upper part of apparatus and hung from bowsprit as shown on opposite page.

Tested column for faulty vulcanization and cleave.

I hung it over side of sacker and let it vis. the water 10 feet deep for over one hour.

I tested for water with a weight on ashing which I let drop down through barrel column.

I done this so if it leaked it could be taken right out of water without getting much of sponges wet.

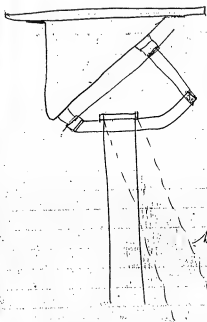
After leaving in the water for one hour

Aug. ~~13~~ 14. 18

We took out and turned
up side down.

No water came out
showing workmanship
all.

Diagram also A/L



low column
wedged
down
effort

Aug. ~~July~~ 15. 18

We left Sandy Hook
dock at 2 P.M. to make
sun test.

When Sachem was
under way the lower
plate twisted and got
column out of line.

This is due to the yielding
nature of the rubber of under
base column also wedged
loose from clamp as
shown by arrow.

We run at 10 knots
and twisted in direct
but, apparatus very
quiet.

We could only hear
a few minutes because
twisting of column pulled
off rubber tube connection.

We could hear our
own boat plates and
there were no water.

Am going to change
superstructure to make
it more practical
mechanically.

Aug. 16, 1918,

I am having made
by the Combination Rubber
Co. 50 ft. of 2" rubber
hose, for head in tube.

This is 3 ply canvas
inserted.

The cheapest grade
of hose they make.

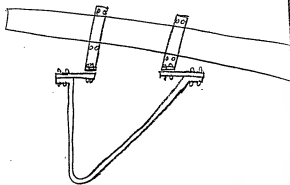
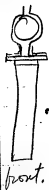
• They promised it for
Tuesday Aug 20.



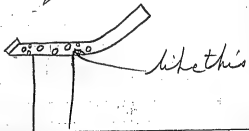
these pieces also keep
it from wedging.

Aug 19. 18.

I done away with the
large plates on upper
structure and built
it up as shown.



Also screwed clamps
to base column so it would
not wedge out.



Aug. 20. 18.

Rubber hose arrived.
We made elbows and
connections for same.

Rigged up Auction.

Covered booth with
cheese cloth.

Charged all batteries.

Boatmen went out,
Captain Harris seen
the Clio Commander
about testing sea
anchors.

We anchored in
N.Y. harbor over night.

Aug 21/8.

Left N.Y. harbor with
also sailed up Sound
to Rye Beach.

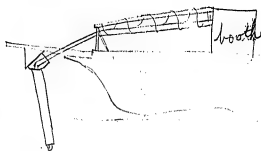
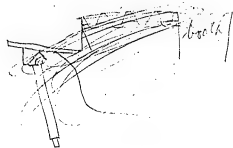
Captain tested sea
anchors.

Laid off Rye Beach
all night.

Aug. 22.

Left Rye Beach for
N.Y. stopped at 12:30
Set Mr. Thompson off.
got water etc.

Went back to 8:00
At. instructed Captain
to store up, and be
ready to go to Sandy
hook Monday morning
early.



Aug 26 '18
Construction of lead
tube from Coleman
to candle booth

← rubber hose
Sponge rubber way foot,
has tubing $\frac{3}{4}$ " hole.

Method of suspending
hose.

1" iron tube,
↑ hose, ↑ friction type

Aug 26. 18.

Reached camp, took at
noon, put hickey on and
hooked up.
Got everything ready
for tomorrow test.

Left hickey on over
night for wear test.

The distance from top
of column to ear piece
is 50 ft. + 10 ft. = 60 ft.
66 ft from diaphragm

Sandyhook, Aug. 27. 18.

Made run at 5 knots.
Listened in direct with
ear tubes.

Sounds very quiet.

Can hear the beats of
the engine on Sackem.
They are very faint and
seem to be irregular, vary
from about 220 to 240 per
minute.

There is no continuous
roar like we used to get
before with wooden models.

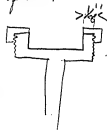
Higher sides to the port
side a few degrees, this is
due to improper alignment.

We come into dock to
correct this before attempting
to run at faster speed.

Run out again at 5
knots.

Rides vertical. A.K.

I made a transmitter
with the granule cup
having a surface of $\frac{1}{32}$ "
porcelain to test at $\frac{1}{8}$ "



regular cups have only
about $\frac{1}{32}$ " surface

27

Increased speed to 10 boats
I hear better yet.

Sister in again direct with
ear pieces.

I hear back plain, no
other noise.
boats are noisy fact
difficult to count.

Hickey makes a terrible
disturbance in water near
water line, due to improper
streamline of cone (to blunt
nose)

This noise is very loud
when listening in the air
at 600 ft of boats.

But cannot be heard
in ear tubes.

This construction is
great for eliminating the
water noises.

We now run abreast
of an American cargo boat,
(just like the Cleo)

We are carrying her on our
port side. We think that is the
side the diaphragm is on.

We count 330 beats
per minute, these beats
are very sharp and plain
and drown our own boat
~~noise~~

Count 336 beats.

We are dead abreast and
about 20 yards away, running
at 10 knots.

We now sheer off from
her at an angle to starboard
for we can hear her.

We signaled him for
R.P.M. He said 70, 2

We get 330 to 336 sharp
distinct knocks.

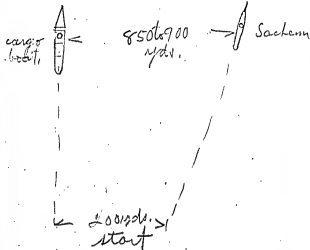
27

We loose him at about
850 to 900 yds.

He is going in to harbor.
We had to loose him.

We could not discern
his noise from our own
after 850 to 900 yds.

We get distance with
sextant on the bridge.



27.

Sachims engine turns
148 R.P.M. at 18 knots.

We count about 300
beats per minute.

They are about the
same in tone, and
occasionally, at a tray, a new
sound is heard.

There is 2 beats to
the R.P.M.

It seems as though
we can't do much with
the canceling apparatus.

We are now running
aboard of an oil tanker.

about 1100 yds away.

beats are now 96 per min.
Name of ship (Atlantic)

We ask Captain for R.P.M.
He says, about 105

We get 96 again.
It our boat sounds

like this. We could cut
it out, as the beats are slow
frequency.

We looze when when
at 750 yds.

Sachem is pitching
some apparatus ^{and} rises
and fall in water about
10 feet.

This does not bother
at all.

It changes the quality
of the noise a little.

We now run abreast
of another cargo boat.

Name is (Toronto) (fuel)

We count 72 R.P.M.

Very clear.

We asked Captain for R.P.M.

He says 70.

We count 72 again.

We are 150 yds away.

We now sheer off and
looze him at 700 yds.

These boats are very loud in comparison with Sachem.

perhaps it is because we get the sound of sonar at right angles to the diaphragm.

Where in the case with Sachem the propagation of sound is in line with diaphragm.

We breast another oil tanker (Ravitan).

count 108 R.P.M.

Captain says their R.P.M. is 110

We then off and bear to 700 yds.

We now run abreast of a tug.

hear to 600 yds.
count 228 beats.

We now breast a whale back oil tanker

27.
(Great Lake type) ^{name} (City of Everett)
We count 73 R.P.M.,
They tell us 73
We hear to 700 yds.

We now breast a
passenger boat (Maricopa)
count 264 beats.
Hear to 750 yds.

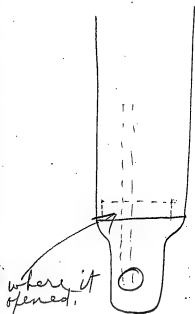
The above data is
correct as Hayes and myself
verified each other in each
case.

We now go into
Hardy Hook dock.

Took of apparatus
to examine.

Found that the vulcan-
izing gave way at bottom
of chimney and let water in.

~~We did not notice
this in listening.~~



where it
opened.

where rubber is vulcanized
to the brass.

2)

It seemed to keep its
absorbing qualities in
spite of the fact that water
got in.

We will have to squeeze
water out and reconstruct
bottom to be stronger
mechanically.

Next time I am going
proper brass netting to
make new section line
form again.

Sept. 9. 18.

Repaired detector and
prepared to go to Sandy
Hook.

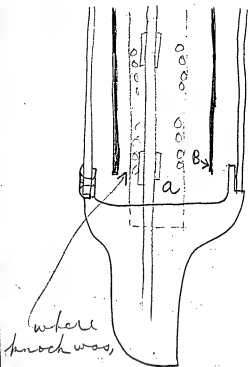
Sept. 10.

Left 8th St. 8 AM.
reached Sandy Hook 10:30
hung detector and went
out on run test listened
in direct with ear tubes

Could hear Larkens
engine

There is a knock.
I think it's due to the
hanging shoe on bottom
lifting column, this
knock is very rapid and
it is impossible to do
anything.

I had a man go
overboard and try to
work the rubber cover
down so that shoe
would clear.



where
knock was,

vulcanizing killed sponge
rubber and brass marked A
hit brass column marked B
due to vibration of the
column riding in the water

Sept 10.

This did not seem to
do any good.

We had to come in
to dock and take off
detector.

Disassembled lower
part found water in and
also there were no wires
we got the knock.

I repaired and did not
vulcanize bottom again
instead put white lead
in and screwed on clamps.

Sept. 11, 1918.

Sandy, Hab.

Run out at 10 knotsified
Hayes counts 300 beats,
engine is turning 156 R.P.M.
I get 312 beats.

There is nothing sharp
or definite about them.

(We are listening direct
with ear tubes)

Knock We experienced
yesterday is gone.

Put on Micro. with
gasoline in gramophone

Can't distinguish
anything.

Continuous roar.

Try Bell telephone
We can try canceling

We hear the beats
very plain, but they
are in very rapid succession
and ~~the~~ all the same

in intensity.

Can't do anything in
the canceling line on the
boat.

Sackem is going in
dry dock for repairs.

Meantime I am
constructing new detector
with better stream line
form.

Purchased 18 ft of
#20 Mesh Brass wire .015"
to reinforce rubber for
new detector.
24" wide.

Also brass wire .05" wide
12 mesh #21 wire.

Had this rubber made
with wire insertion by the
Manhattan Rubber Mfg.
Co. of Passaic.

(C11)

Nov. 15, 1918.

Left Edison Lab. with
experimental equipment
for Sachem, lying at ft.
of 79. at 11:30.

Nov. 16.

Find things in very
bad shape on Sachem.
Will take 3 or 4 days
to clean and straighten
things up. Before we can
leave for Sandy Hook.

There is no batteries
on Sachem same being
in factory for repair.
expect them return anytime.

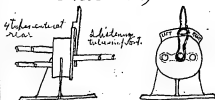
We cannot haul light
without dynamo running.

Nov. 18, 1918.

Am getting working
diaphram apparatus ready
for experiments, and so
getting old single diaphram
apparatus ready to make
comparative tests.

I am having made in the lat a double bell three-way valve so as to make it possible to hear a boat on both the left and right side or the left or right side separately.

This valve is to be used in connection with the 4 diaphragm affair (2 diaphragms on each side.)



When lever is in center position both the port and star-board side leads to the two ear tubes. If put to the left side or right side only the respective diaphragms in apparatus will lead to ear tubes.

back view



front view



inside drum showing construction

Nov 18 1918.

Left 86th St for Brooklyn Navy Yard to put of sea anchor.

We will wait here for batteries as we can have the Navy Yard people install them here.

Nov. 21.

Left Sackham for lab with spectroscope for Mr. Edison. returned same day.

Nov 22.

We decided to borrow batteries from storage battery Co. so that we can go out Monday. We went home for Sunday.

Nov 25

Returned to Sackham and proceeded to Sandy Hook. got things ready to make test Tuesday with old apparatus etc.

This is the first model we made.

Nov. 26.

Suspended apparatus from bowsprit, and rigged up tube to booth from same.

I am using a taper tube tapering from $\frac{1}{2}$ " to $\frac{3}{4}$ " 2 ft long from top of hatch.

I use the same size tube at booth end taking down from $\frac{3}{4}$ " to $\frac{1}{2}$ "

Everything is ready to make a run test tomorrow.

It was late to make a run test today as it got dark at 4:30 P.M.

Nov. 27.

We run out from dock at 5 knots speed.

Hayes is listening.

Apparatus seems to be in line, so we increased speed to 10 knots.

Hayes says he can hear the Sachem's heat planes than he could before (in previous tests)

We were running at 10 knot speed for about 10 minutes when brass column doubled up. It bent about 2 ft below suspension.

Upper structure must have been disturbed as it was left in perfect alignment.

Captain Harris said they had hit this structure while at the Brooklyn Navy yard.

Water was quite choppy
but not near as rough as
when we made the previous
tests with this same apparatus.

We went back to dock
and removed apparatus and
then proceeded to get to go
home for Thanksgiving.

Nov. 29.

Went to Lab and reported
results to Mr. E.

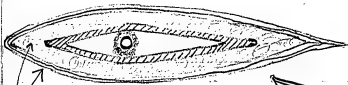
I intended to stay out
until all experiments were
completed, but was ordered
by the Captain and Officers
to come in for Thanksgiving.

Mr. E. sends for the
Captain.

Nov. 30.

After discussing conditions
with Captain Harrison
Mr. E. Library, and the
Captain having agreed to

The No 2 apparatus is the new single tube affair with the brass wire inserted rubber on the out side diaphragm on the Port side of boat.



This rubber is $\frac{3}{8}$ " thick and reinforced with #20 mesh brass wire, 0.15"

Sponge rubber made by the Miller rubber Co. 20" sq. $\frac{3}{4}$ " thick.

remedy things. We arranged to go aboard Sachem Sunday night and go out to hook Monday morning.

Dec 1.

Met Hayes and Burns and proceeded to Sachem. arrived at 10. P.M.

Dec 2.

We left 7st at 8.30 A.M. arrived at Sandy Hook at 10.30 $\frac{3}{4}$

We got our No. 2 apparatus ready and put same on.

Plid it stay in the water for disintertine in order to get a test for leaks.

After it was in water about 1 hour I tested by letting a weight tied onto a string and let same drop down into the outer casing, and then in the conducting tube.

Found that the casing
did not leak.

Found water in con-
ducting tube. (diaphragm leaky)

Raised out of water and
could not find any reason
for it leaking.

Probably it was not
screwed in tight enough.

We cleaned all water
from tube and put fresh
white lead on diaphragm
holder and screwed down
tight and put hickey back
in water again.

After leaving in for
a while made test again.
Still leaky.

Removed from water
and examined.

Found that holder fits
in booze (due to poor work
manship).

I found one out of
a number I had made, to fit
 snug. We assembled again
 using this holder, and tested
 out off water by blowing
 through tube.

A strong person can
 blow about 1.5 lbs. per sq. in.
 I put soap water on dds,
 so as to detect any leak.

The area is about $\frac{1}{2}$ sq. in.
 the pressure on this is about
 1.5 lbs. at 6 ft. depth.

The pressure it stood
 without leaking was 3 lbs,
 this leaves a safety factor
 of 100%.

This is ready to put on
 tomorrow morning.
 Darkness sets in at 4:30

Dec. 3.

Tested diaphragm for leaks before putting on, by having Hayes blow in tube and putting soap water on diaphragm to detect leaks better.

Found A.K.

Put detector in position and lined up with the bow of the boat when the former is in a vertical position.

This lining is done by sighting with the eye.

We now start out from dock at 5 knots speed.

Nine 2 P.M.

Weather is very calm.

Hayes is listening direct with ear tubes.

We have a 3 ft long taper tube ($\frac{1}{2}$ " to $\frac{3}{4}$ ") on the hearing end and 4 ft on top of column to conducting tube which is $\frac{3}{4}$ " tubing all the way to booth.

Column reads fairly good. It is just a trifle off to the Pat side.

It seems to leave

quite a wake in spite of
the streamline form

Hays says He counts
240 beats of Sackem.

Her Rev. at 5 knots on
120.

There seems to be a
steady roar of a very low
character which makes this
model more noisy than the
old No. 1.

The beats are not so
clear.

Increased speed to
10 knots.

The wake is far greater,
in fact almost as bad as No. 1.

The noise also increases.

It being a little out of
line may cause this, so we
come back to dock.

It gets dark at 4:30
P.M.

We correct alignment
so as to be ready to go
out the first thing in the
morning.

Dec 4.

Left column on all night and am going to test this morning for leak before we start out.

Find casing and tube dry.

Leave dock at 9 AM.

Go outside the Hook to listen for ships.

We are running at 5 knot speed.

Water is very choppy and rough.

Sackem pitches and rolls a lot.

Hayer is listening.

Listening noisy.

Rides vertical.

It seems to be in perfect alignment now.

Increased speed to 18 knots.

Noise also increases cant count beats of Sackem.

I dont think we could hear any boats with this noise present.

I listened with ~~the~~ ear
against different parts of the
structure of bow sprit to learn
if any moving part made a
noise.

Find everything O.K.

I decided to run this noise
down.

We disconnected lead in
tube from top of column and
plugged with a cork to learn
if it was the effect of the wind
(which was blowing strong) on
the rubber hose casing.
(This casing being affixed to
the wind)

Listened very quiet showing
this was not the cause.

We now connect back
again and shut off engine
instantly and let boat go
under her momentum.

Noise diminishes as the
speed of boat diminishes.

When boat comes to
rest, this ~~noise~~ ~~no~~ ~~noise~~ stops
and the only noise is the
circulating pump, which is
very faint.

When this pump is
shut off, there is absolute
quietness in activities.

This pump circulates

the salt water around condenser coils, and has to be in operation at all times.

It can only be stopped for a few minutes at a time. We now start again and speed up to 10 knots.

Sackam engine is very plain at first, but as soon as the boat gains speed the clearness of the beats are lost, and it results in this noise.

The noise seems to be what we got with the old wooden models, only of a very low quality.

This is reasonable because of the respective nature of wood conduction and rubber conduction.

I repeated this stop the engine test 3 times and each time the results were the same as above.



Form it
assumes
when in
motion.

Terrible wake and splash
have when going at 10 knots.
This is the first I have
It is so great that the sponge
rubber won't absorb it.

As a result of the fore-
going tests I come to the
conclusion that the noise
is due to the splash and
wake of the column running
through the water.

This makes an awful
noise in the air which last
evening at the bow of the
boat.

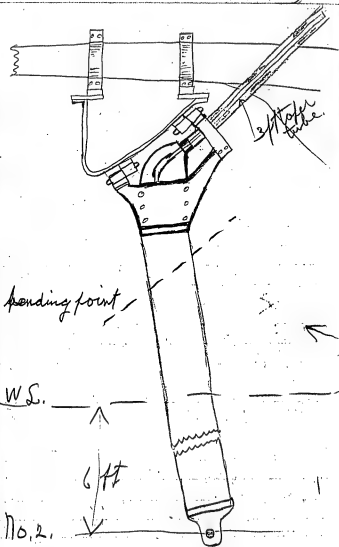
Weather now is very
rough.

There is a storm brewing.
The apparatus comes
completely out of water at
times when it starts pitching.

Noticed when it
comes up and down in the
water that it is deformed
due to the pressure of the
water on it.

The wire insertion in
the rubber is not stiff enough
to counteract this pressure.

The size of this wire
is #20 mesh and 1015' hard brass
wire.



We were about to come about and the boat gave a pitch that lifted column out of water about 2 ft. and when it was going back it bent about 1 ft below suspension.

This is what happened to the No. 1.

Both bent the same way and in the same place. There is a terrible strain at this point when boat is pitching and running at 10 knots.

We pull up model along side and go into dock and remove

I am getting No 3 model ready.

The wire insertion in this one is 12 mesh #21 brass wire.

This is much better than No 2.

I am sure it will not
deform due to water pressure

I will not go out in
rough weather to make tests
with this one as it is not
constructed strong enough
to stand great pitching.

Meantime we are
going into Base 6 at Benson
hurried to get some provisions.
We lay at anchor here
all night.

Dec 5.

Left Benson wharf for
Randy Hook dock at 9 AM.
It was so rough that
we could not make dock
so we anchored off
hook.

Captain wanted to go
to #4 supply base to
get some supplies. He
ordered some time ago.
We left Hook at
1 P.M.

We are ready to continue
experiments with No 3 as
soon as the weather is
favorable.

Dec 6.

Left 24th and went
to Brooklyn Navy yard to
get (mole supplies)

Came back in to 24th
in the afternoon.

Terribly stormy today
70 mile an hour gale
blowing at noon.

Hays and Penna left
boat at 4.30 P.M.

I left for home 7 P.M.

Dec 7.

Went to Lab to report
to Mr. Edison.

He said column
should be long enough
so as not to come out of
the water when boat is
pitching.

Returned to Aachen.
Captain said storm warning
was repeated at 4.30 P.M.

Went Home for Sunday.

Dec 8.

Returned to boat 8.30 P.M.

Dec. 9.

We left 24th, at 8 AM and went to the Brooklyn navy yard, to get a prisoner and some boxes I had made to cover rubber floor. (waterdupaho)

Left yard for barge dock arrived there at 10.30

Fitted diaphragms in No 3 detector (64 tube, 2 on each side) and put overside of sackam for leak test.

After leaving in water hose I tested by putting weight with string in tubes and casing.

Found casing A.K.

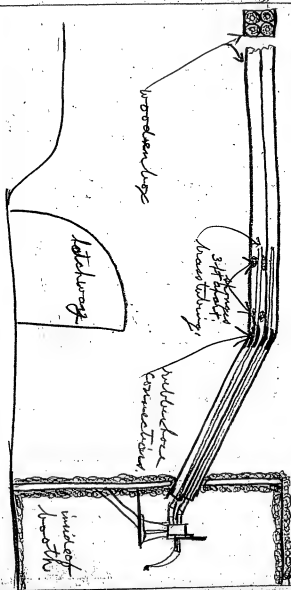
Found that 1 diaphragm leaks.

We take out of water and repaired. (It was not tight enough) and put back again.

After it was in water for 1 1/2 hours, made test again.

Found everything A.K.

Rigged up wooden boxes from bow to bow of boat.



I am putting sponges 3 ft. apart.

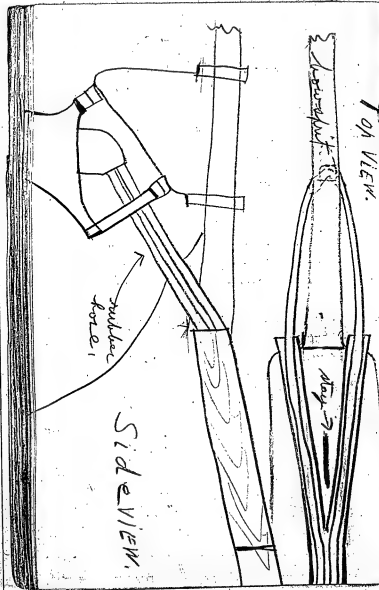
On account of being in wooden boxes 1 sponge every 3 ft. is sufficient to hold trans tubing in center. It also increased the outside sound absorbing qualities.

Dec 10.
Stormy to day, would not take any chances.

Dec 11.
Very stormy and raining all day.

Left column in place over night.

Tested in morning of Dec 12. everything OK.



Dec 12.

Very calm this afternoon.
We run out at 5 knots
speed. Colum rides beautiful
at this speed.

It is in perfect alignment
and leaves but little wake.
Distances beautiful.

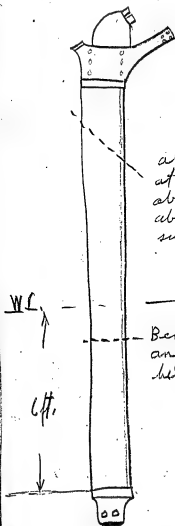
Satchum's beats are very
clear, the beats of the
circulating pump can also
be heard very plain.

I listened in each
tube to see if all four
diaphragms were working.
All 4 OK.

This beats the old
No. 1 all to pieces, for
clearness and quietness.

We were only running
about 10 minutes, and getting
valve into place, when
column caved in.

It bent in two places.



also bent here
at an angle of
about 45°.
about 2 ft. below
suspension.

Bent here at right
angles, about 1 ft
below water line.

as shown in sketch.

Returned to dock
and removed damaged
apparatus and proceeded
to 79 St. N.Y. & North River,

We stayed here all
night.

Note

This No 3 model
held its form fine.

It did not deform
due to water pressure
on the front when under
way.

Note

I think the reason for the
breaking is because of the
inertia of the upper moving
parts.

That is they were not
constructed strong enough.

to resist the inertia.
The water acts on
lower part very quickly.

This is proven by the
fact that the old wooden
ones would not break
in any kind of a sea.

There was no appreciable
weight for them to move.

Dec. 13.
Myself, Burns and
Hayes left boat for
range 11 1/2.

Reported to Mr. E.

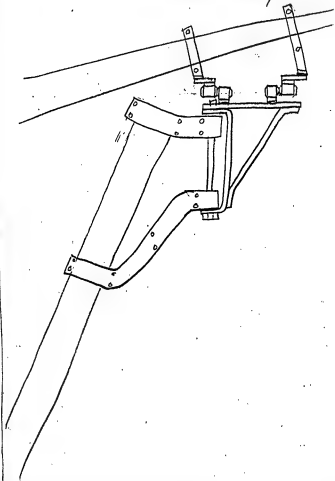
Am going to experiment
to find a better method of
suspension.

Dec 16.
Am laying out some
work to be done in the
Brooklyn navy yard.

Am in communication with
Captain Harris every day.

Dec 21.
Completed drawings and
went over to factory, then went
to the Navy Yard and got work
started.

New universal suspension



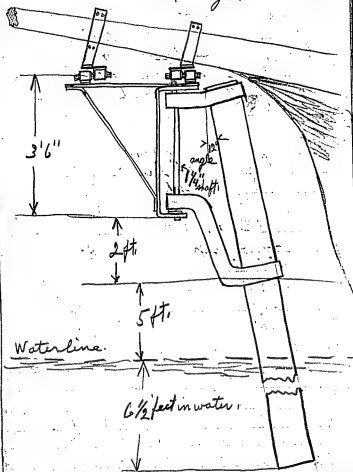
Jan. 2. 1919.

Am getting new suspension
in place.

Received all parts of my
job from Navy yard.

Rig up for test No. 1 like this.

Total weight 520 lbs



Jan. 15.
After ship fitters finished work on hatch we left navy yard, went over to 24 St (Jan 52) to get some provisions. We then proceeded to sandy hook, arriving there at 5:30 AM.

Jan. 16.
Rigged up suspension on bowsprit as shown on opposite page. It is very rough here to day, and makes progress of work difficult. However got column in position before night fall. Have everything ready for test to morrow.



Jan. 17.

Test No. 1.

To determine riding qualities of column swinging on a vertical and horizontal axis.

Weather calm.

We left dock and sailed out at a speed of 5 knots

Column wants to come to the surface, swinging on the horizontal axis.

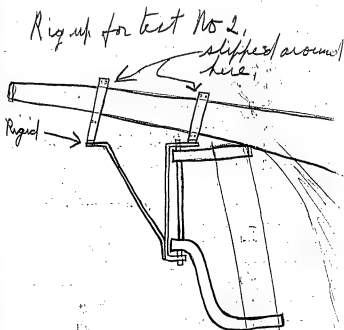
The two axis do not seem to work ~~together~~ together

It seems as though it should be rigid horizontally.

We did not get this effect with small model in salt.

This universal method is (no good)

We return into dock and prepare for test No. 2.



Test No 2,
 I removed horizontal
 bearings and made rigid as
 shown in sketch.
 It is now free to swing
 only on a vertical axis
 (Like a boat rudder)

Went out again at 5 knot
 speed.

Seemed to be O.K.

Increased speed to 10
 knots.

There is a tendency for
 it to come to the surface

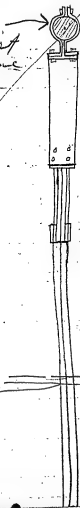
After riding at 10 knot
 speed for a few minutes it
 rose to the surface.
 It slipped on bow spirit

I straightened it up
 and tried again at same speed

Came to the surface

Front view.

column would twist
clamps and assume
a position down
by this line.



again.

The clamps on the bowsprit is only 3" wide, those are the ones used before in other experiments.

They have not enough of bearing surface to ~~hold~~ overcome the resistance of column.

I think by making those clamps about 6" wide there will be sufficient grip to hold it.

However the tendency to rise remains, when load is applied, and it seems as though this method is not very practical with such a long shaft.

Construction of dummy shaft.

wood covered to
get proper form



iron bar 17 ft
long $\frac{1}{2}$ " x 5" wide.
for rigidity.
weight of bar
140 lbs.

weight of wood
about 50 lbs.

This makes a
negative buoyancy
of 1.15 lbs. as
there is only 6 to
7 ft submergence
at normal times.



Jan. 18.

We now come into to the
navy yard. 1030 AM.

I left for Lab. to report but
missed My train.
Will keep it Monday.

Jan 20.

Reported results of fact
experiments to Mr. E.

I am having Burns make
a model of a new scheme for
suspending shafts.

We are now in search
of another boat.

Jan 22.

After looking at some boat
We decided to buy a
most suitable boat for our
purpose.

Jan 23.
Am constructing various
scale models of wood to learn
if form has any effect on sliding.

Jan 25.
Have Burns making new
suspension.

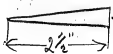
Jan 27.
Myself and Burns went to
Sackville this P.M. with models.
I thought for truck to take
machines from Sackville to Lab.

Jan 28.
Negot machine and supplies
in shape to move of boat.

Jan 29
truck arrived, We loaded
same and transferred material
to Hawk.

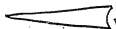
I went out in the small
launch in the P.M. to try small
models. Had Burns along.

Nos.
123,



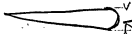
3 of these
different thickness
in $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$,

Nos.
34



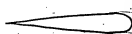
2 of these
 $\frac{1}{4}$ " and $\frac{3}{8}$ "

Nos.
56



2 of these
 $\frac{1}{4}$ " $\frac{3}{8}$ "

Nos.
789



3 of these
 $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ "

Nos.
10, 11,



2 of these
 $\frac{5}{16}$ " $\frac{3}{8}$ "

The above were all 34" long
 $2\frac{1}{2}$ " wide. The thickness was
as shown.

Jan 29,
I tried all the different
form models shown on the
opposite page.

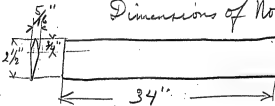
I find that the shape of
the model has nothing to do
with the riding qualities.


The resistance of all
the forms were very great
it being almost impossible to
hold them with both hands.


The best one, that is the
one having the least resistance
and creating the least distur-
bance was the No. 10.


This was very easy to hold
with one hand.

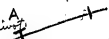
Dimensions of No. 10.




No 1.  straight suspension

No 2.  25° suspension.


No 3.  45° suspension.

No 4.  25° with first at A and a plate on the back as shown



No 5.  25° with slot curved down from center.



No 6.  25° with slot curved up.



I also tried the different suspensions shown.

I found that column would stay in water at 25° angle, as shown at No 2. but it would go from side to side when rocking of boat is imitated.

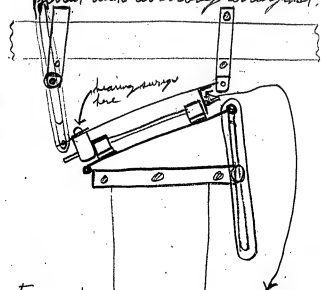
No 4 scheme works very good, the slot in the back bearing allows for this rocking. And lets the column remain straight.

This is a pretty good stunt.

No 3, is terrible. The strains can be plainly seen when rocking.

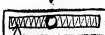
No 6 can be improved. Am going to develop the No 4 scheme. It looks good. Left Sack for home 7 PM.

Model made so as to get any angle
desired with absorbing arrangement.



Front.

Column.



view from
back of
absorber.
springs.

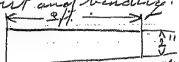
Jan 30,
Left Lab to go aboard Haulic
to instruct Captain as to work and
alterations to be done.

Jan 31.
Am working a new expansion
so that I can change the angle
from a straight to 45° and get all
the intermediate angles.

I want to find out the minimum
angle that column will ride at.

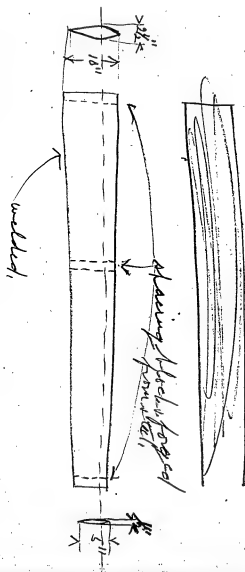
Feb 4.
Have this ready to try on
small launch as soon as it gets
turned over to Haulic.

Feb 5.
I made some scale models
from sheet brass to demonstrate
the twist and bending.



this is very rigid.

3 1/2"
1 1/2" brass



Feb. 6.
I moved from No 4 Bldg.
to No 1. Bldg.
Am having room No 3 fitted
up to carry on experimental work.

Feb. 8.
Am laying out a one-half
size column to use on small
launch with new suspension.
(on opposite page.)

As will be noted this will
take both ways.

It is made of $\frac{1}{2}$ " machine
steel, with three spacing
blocks at equal distances.
It is welded along front
and back seams.

Feb. 10.

Went to Hauoli at Benson
hurst to get my tools.

I also brought over 3 ft
model and suspension.

Feb. 12.

Receives word from Mr Barry
that launch was turned over.

Feb. 13.

Left for Bensonhurst to
try model out in small boat.

Captain Harris takes command
of Hauoli, and Capt. Grosz
leaves boat.

Feb 13.
I made the following tests
in launch in the afternoon,

Test No. 1.
Tried streamline column buoy
in a horizontal position.
This would raise out of the
water (I expected this)

No 2.
Tried at angle of 5°
Would still come to surface

No 3, trial 10° angle.
The tendency is reduced noticeably.

No 4,
Tried 15° angle.
This is much better.
The absorbing arrangement
works fine here without intimate
cooling by wetting bow-sprit.

No 5.

Tried angle of 20°
This is fine the column
stays vertical no matter what
I do with bow, i.e. (load or
pitch)

No 6.

tried 30° angle.
This seems not quite so
good, it seems to be too much
angle.

The 20° seems to be the
point.

I tried again at 15° to
see if I could reduce it any
but 15° is not quite
enough.

It acts sluggish.
 20° is fine. I observed
it making at this angle a long
time.

The absorbing student is
O.K.

This is quite an advantage
to reduce from 45° to 20°

as it eliminates a lot
of strain.

The shock absorber takes
care of what little strain there
is left.

All the above tests were
made at a speed of 10 knots,

Model is much more steady
when at a rate of 50 than
when vertical.

There is a little vibration
when vertical.

Now come in and go
home.

I left instructions to my wife
Capt. Harris to get it carried in
good shape as I will be
ready to use it in a few days.

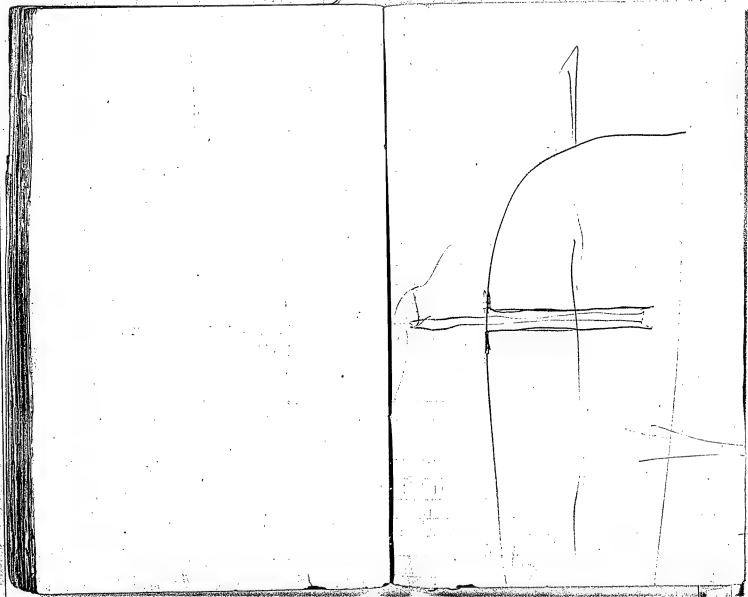
Feb. 14.
Burns has 8 ft column
finished except smothering of
a little.

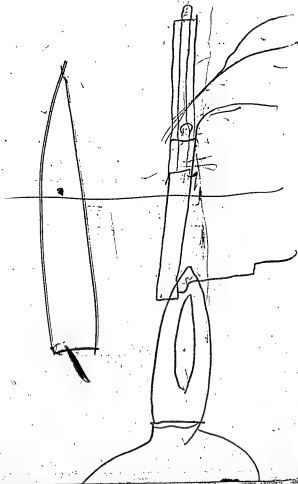
This is a very rigid affair
does not twist or bend.

I tried to twist with a 2
ft. lever on bottom but
could not notice any twist.

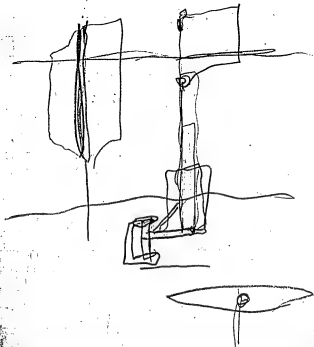
I am laying out an
absorbing suspension to
put on burned to try out
for riding on same in a
rough sea.

Continued in Book No 2.
Sub. detector experiment.





res of No 1 transmitter,
 69 ohms before putting in water
 res of No 3 transmitter =
 76 ohms before putting in water.
 No. 2 18 ohms.



**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments -- J. A. Hanley Books
Notebook N-19-02-15.2**

This notebook was used by John A. Hanley during February-September 1919 for experimental notes on submarine detection. Most of the entries pertain to tests conducted at sea on detection equipment. The book ends with the note "Burns to do this. I am to continue on Storage Battery job." The notes indicate that Hanley was reporting to Edison through William H. Meadowcroft. The front cover is labeled "Experiments. Edison Submarine Detector. No - 2. From, Feb. 14-19, To." Numerous loose pages relating to these experiments have been inserted into the book. The pages are unnumbered. Approximately 125 pages have been used.

J. Hanley.
Edison Lab.
West Orange
N.J.

75428
Home Co.,

MFG. STATIONERS,
96 JOHN ST.
AND
19 PLATT ST.
NEW YORK.

Cont. from book No. 1.

Feb. 15.

Am making a report of work
and experiments to date, to send
to Mr. Edison

Feb. 17.

Gave Mr. Meadows a
report to send Mr. Edison.

Feb. 20.

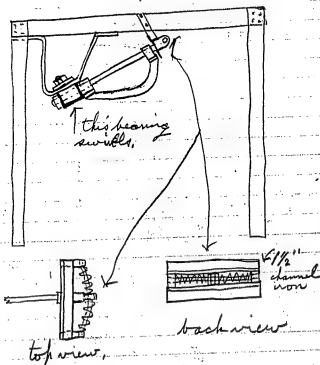
I went aboard the *Hawali*
at Bensonhurst.

Capt. Harris said the navy
people did not want to make
the desired changes in regard
to fitting up a ship.

So we decided to let it go
as the work in the future will
be of a large nature, and
could not be done very
well on a boat.

Am going to have small
lathes gone back to the lab and
set it up in No. 1 Bldg.

Am also having tools etc.



returned to lab.

Feb. 24.

Finished work on suspension and setup in lab as shown on opposite page.

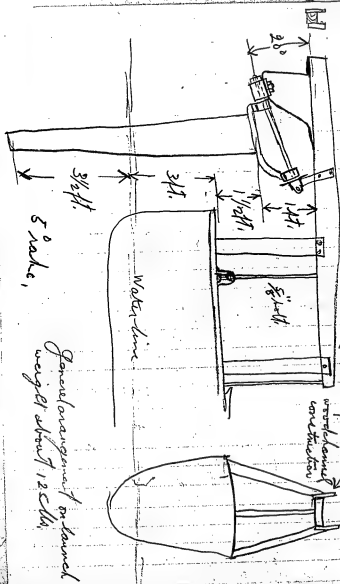
I did this so that I could find any defects (if present) before putting it on launch.

Feb. 25.

We shipped apparatus to the Hancock, now at E 23rd St. N.Y. and had the material aboard returned to lab.

Feb. 26.

Burns and myself fitted the outrigger to launch. (on next page.)



Feb. 27

We take a trip down the east river with intentions of going out in the lower bay.

We got as far as the Brooklyn bridge and nearly got swamped. The river is very treacherous here as the tides melt.

We return and go up the north part of river.

The column behaves fine regardless of how the launch is being tossed about.

The speed of launch is 10 knots.

We make sharp turns from left to right alternately and we get roiled and tossed about by getting in the swells of ferry boats.

The absorber can be seen as taking care of the roiling and the wake slapt.

There does not seem to be any strains or twists as was noticed in the other tests (45° suspension)

This is a very severe test.

I think if we had this affair at 45° something would be broken by this time.

We come in after about 6 hours of running.

The springs in the absorber were not hardened, and due to the continued use, they became shortened.

I am going to have some more springs made and hardened and continue tests.

March 9.

We went aboard and put a new set of hardened springs in place.

We then proceeded for a run test.

Springs seem to be a little short so we return and put longer ones in.

We now go out again.

Works very good now.

We run down the river and get in the wake of ferry boats and large river steamers. We also get in all kinds of cross currents and launch got tossed about like a cork.

at times the whole affair goes under water and then

completely out.

There is no effect on column at all,

It remains vertical.

It seems as though it's almost impossible that any thing can stay at on the bow of a boat under such conditions,

I think it would outlast about 6 launches.

We return after running about 7 hours and immediately and remove from launch.

I am going to set this affair up in lab. so that Mr. Edison can examine it when he returns from Fla.

March 4,
I got sufficient dimensions
of bough of the Hauoli to
lay out an outrigger trans-
verse column, had Burns along.

She has no bow-sprit
like Akelem had.

Am compiling a report to
send to Mr. Edison.

March 5.
I am laying out a structure for
bough of Hauoli.

Burns is fixing up lathe in
No 1 bldg.

March 11,
Burns works for Hayes.

March 12.
Had Burns go over to Hauoli
in a dory to bring back
a ft. model.

March 14.
Bums is listing the returned
material, tools etc.
We return a list of same
to stock room.

March 15.
I sent drawings of affastens
for the Hancock to Mr. Edison
for his approval. (to Ft. Meyer
Fla.) meantime I am laying
out all the parts in detail.

March 14.
Received A.K. drawings
from Ft. Meyer.

March 26.
I got a letter from Mr.
Meadowcroft to Admiral Bird
and went over to the Navy Yard
with same also drawings.

Had Jimmy Bums start to
make the templates to form
column by.

March 27.
Capt. Harris and myself went
to Navy Yard, I gave letter to
Admiral Bird. He A.K. drawings
and we handed it over to the
engineering Officer to be
started at once.

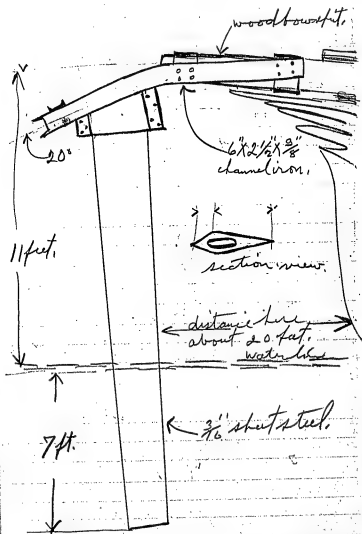
March 27.
I take templates over to
Navy Yard.

March 31.

I am laying out an instru-
ment to record the behaviour
of the boat as to rolling and
pitching.

This instrument is to be
used in experiments of the
future.

This will enable me to
keep take and keep record
of the action of the boat to
compare with the action of
the column.



I go over to the yard about every second day to see about the works progress also to explain the different drawings. The rest of the times I put in on the recorder.

April 17.

The parts are mostly ready to fit on to axle.

Many people have ordered to go ahead and fit the axle on.

See Mr. Edison.

April 18.

Capt. Harris came out to lab.

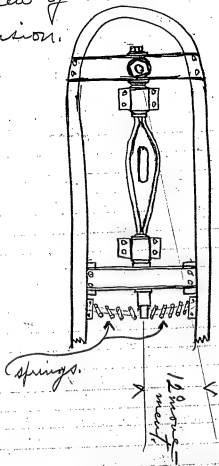
April 21.

Capt. Harris and Mr. [unclear] went aboard the ex German submarine V 111.

They would not allow anyone below deck.

The Chief Electrician said that the listening apparatus

top view of absorber and suspension.



was taken of and smashed up by the English.

I guess the Germans did not consider the listening proposition essential in connection with the efficiency of their subs.

Apr. 25.

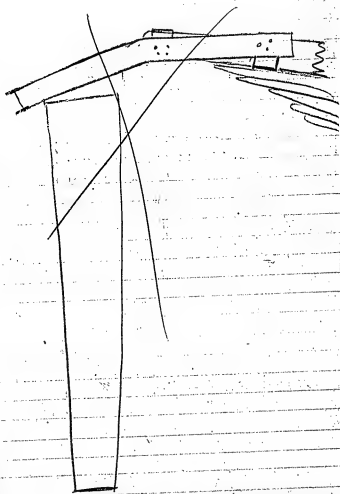
Am having six springs made and hardened from different sizes of material to be used in connection with absorber.

Apr. 26.

Old bowsprit was taken off Harlan to make way for new one.

Apr. 30.

The battleship Tennessee is being launched at Navy Yard today.

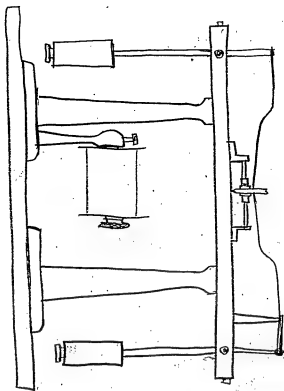


May 5.
The apparatus is finished
and is lying at dock, near the
Hauler.
It is ready to put on.

May 12.
Furnished Engineering Office
of the mill division with
drawings and order as requested.

The above was required
before work could be started
as first order covered only the
construction.

May 13.
I went to yard, brought two
sets of springs for absorber.
Two men are putting out
upper and column in place on
the ship and expect to have it
finished by tomorrow noon.



May 14.
I went in that and got things in readiness to go aboard the Hgwoli. I seen Mr. Edison and told him we were going to New London Conn. to see the Telesia, at the same time test the riding of column.

Also asked to take Burns along.

We left Lab at 11:50 AM. in Ford car with recording instrument, tools etc.

Arrived at yard at 1:20 PM.

Left dock and got under way at 2 PM.

After maneuvering around the yard for about one half hour we proceeded to Bunker Hunt and anchored there for the night, it being too late to go to sea. (4 PM)

We are going to take the outside course so as to get as near to the actual

We hit a log of wood while coming down the bay. This could not be avoided. I did not do any damage

conditions as possible. The column behaved very good while under way at full speed.

It had quite a severe test while we were maneuvering around in navy yard, and the East river as we had to back up at full speed at times.

Of course we would have to raise to the surface when backing as the river gave this phase of the proposition any consideration.

→ The above run being made in the river and lower bay it was fairly calm there.

I set up recorder in the chart house of the Harbort, so as to have it ready for operation tomorrow.

Myself and Burns inspected the suspension while at anchor and found everything all right.

May 15.

We pulled anchor and left Benson pier at 7 A.M. and proceeded to sea for New London (outside course)

The sea was quite rough (choppy) and boat pitched and rolled considerable, as shown by recording instrument.

There was a very stiff West wind blowing.

Speed was from 12 to 14 knots.

The apparatus worked fine.

At 5:10 P.M., one of the bronze bearings blew away.

We were pitching severely at the time.

Upon examination of the bearing found that it was a very poor casting, being mostly dirt.

The apparatus rode continuously for 10 hours under

severe conditions all the time.
This is shown by records.
This accident happened off
Montauk Pt.

We removed the column
from on the jigger and placed
on deck, then proceeded to
Fort Pond Bay to anchor over
night, it being too late to go
to New London.

We dropped anchor in
Fort Pond Bay at 8 P.M.

The above test was by far
the most severe test we put any
apparatus to so far.

May 16
We started from Fort Boy
bey at 6 A.M. and arrived at
New London at 8 A.M.

The weather was fine and the
water very calm.

I took a record of the boat
behavior to compare it to
yesterday's record.

New London fore
The Captain Dennis and
myself went to the experiment
station fore to see if we
cant get a new casting so
as to continue test all way
back. We took in other
casting to use as pattern.

The People fore said
We could have it by Monday.

We then went up the
Thames to look for the Felina
After locating and inspecting
her we found that she had
been in a collision and that
14 feet of her haunch was

taken away and consequently
she is out of commission.
We learned that it
would take at least two
months to put her in commission
and she has very poor
acomodations ^{at last}.
She would not be
suitable for our work at
all.

I went to town in P.M.
and sent telegram to Mr. Elson.

I bought some oil etc.
for recorder.

Also made some new
pens so that I could get
roll and pitch simultaneously.

We are lying at anchor
in the channel under

The recorder is a very
valuable affair.
Certainly works fine.

May 17.
The finished bearing
was sent to the Hamoli from
the experiment station.
It is too late to put column

on.
We will coal up and
water up Monday morning
and then go out in the Thames
and anchor and put column
in place.

May 18.
Sunday.
We observed the Sabbath

May 19.
We went to dock for coal
and water, left New London
at 2:30 P.M., arriving at Fort
Pond Bay at 4:30 and anchor.

After correcting the align-
ment of the bearings as best we
could, we put the column in
place, using the anchor tackle
to do so.

We got everything in readiness with the exception of putting springs in absorbers. Dorkens having set in and making further work impossible.

I took a record of the ship's behavior while coming across block island sound. It was a beautiful day and very calm on the water.

There were groundswells present as shown on records.

I listened in on the Handley's listening gear while coming across the sound. (M.V. tube)

All that could be heard was a continuous roar, which I think was due to water noise.

This roar was constant regardless of the position of the compensator.

There was no centering or binodal effect.

The engine of the Hauoli
could not be heard plainly.
Could not count the R.P.M.

I had a graduated listener
on board, listen in.

He could not hear anything
except the roar.

He said that this type of
apparatus was never any good.

That is it could not be used
while ship was underway.

May 20.

Everyone awoke at 5:30 AM.
to get ready to get underway.

We put springs in the
absorber and got the affair
working in good shape.

It moves very freely now
from side to side.

We started from Fat Pond
bay at 6:30 AM.

The weather was very clear
and water was very calm.

Swells were present.

There was a slight east
wind blowing.

The absorber could not work to its full capacity, therefore due to the binding of the bearings.

This also helped in great measure to break the bearing.

After getting around Montauk point, we take a steady course, West by South.

The absorber works very good now. The action is much more pronounced now since we aligned the bearings.

The binding is not present that was experienced Thursday.

The absorber is constantly taking care of the boat's vibrations.

We sail at a steady speed of 13 to 14 knots.

We have a lookout stationed at the bow of boat no. 2 as to notify if anything goes wrong or if we approach Long Island.

About 2:30 PM when we were approaching New York we increased the speed of the Hawoli to 16 to 17 knots.

The column rides just the same. There is no difference.

in the riding condition at
this high speed.
Of course the wake at the water
line is greater.

When running at high
speed of 15 knots there was
present a distinct note which
was very loud.

This is due to the column acting
as a reed.

Everything seemed to be
in right proportion to produce
this note.

The note was D.

The covering of upper
will of course change this con-
dition.

I bored a hole in the wooden
plug in top of column, and put
a set of ear tubes in to listen to
the noise of the wake.

There was a steady roar
due to the wake left behind
column. I guess a lot of this

noise is due to the surface friction also.

When column would hit a ship or any small ~~surface~~ object in the water, it was very loud in the ear tubes.

It seems as though this noise was no greater than the noise experienced in the M.V. tube affair on Hanoi.

I took records at various times during the day.

Coming in New York harbor, W. hit a log of wood about as large as a railroad tie. This could not be avoided.

The column broke it in two pieces.

This shows the apparatus can stand quite a severe blow.

The speed was about 13 knots.

We arrive at 79th St and

north river, and then up to dock there.

In the test of the above few days, the column was on boat while under way for 23 hours. The maximum speed attained was 17 knots.

The records show the ship's behaviour, heading, location etc.

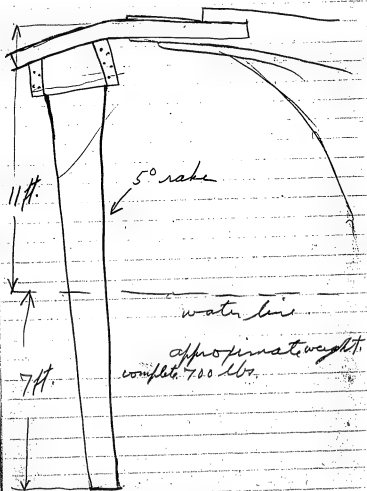
This test is by far the most severe we have put any affair on through of a boat lot.

While running at 17 knots speed one of the springs in the column became strained and shortened up.

This however only affected column ~~to~~ to the extent of a few degrees list from the vertical.

This would in no way impair the operation.

I will have new springs made to overcome this.



Myself and Burns leave for home at 7 P.M.

The sketch shows the arrangement and dimensions of the apparatus.

May 21.
Went in lab. and reported results to Mr. E. also gave him report on Felucia.

Am having a new set of springs made for absorber. $\frac{3}{8}$ " steel, $\frac{5}{8}$ " pitch, 5" long. Acertained from Mr. Knox of the Manhattan rubber Co. of Passaic, if it was possible to make wire inserted rubber 48" wide. answered in the affirmative.

I ordered 15 sheets of sponge rubber 20" sq. from the Miller rubber Co. of Akron Ohio.

Am having made brass

wire netting No 12 mesh No 21
and No 22 wire, by the City
wire works.

The wire we used before
was No 21 each way but the
City people said it would be
impossible to get No 21 wire at
the present time, and that they
had plenty of No 20 and No 22 on
stock.

The combination of 20 and
22 is practically the same in
every way as the No 21.

May 22.

Burns called at lab for
springs and I met him in Newark
and we proceeded to New York,
arriving aboard the Havoli
at 79th St. at 11 A.M.

May 23.

We put the springs in the
absorber in the morning.

It was very foggy and we
could not go out until noontime

The fog lifted around that time.

We left dock at 12 o'clock for a test outside, sandy hook.

The sea was very choppy and a stiff wind of about 25 miles was blowing.

The Hauoli pitched and rolled a lot as shown by the records.

We took a record of the boats behaviour for the whole trip.

We took all sort of courses in order to get the maximum roll and pitch.

We put the affair through a very rigid test for about seven hours.

The absorber works much better with the new springs.

The whole affair would submerge at times and occasionally raise completely out of the water.

It seems to me that we could not put it to a more severe test.

I listened in on the MV tube on the Hawoli when we were trying to

There were a lot of water noises due to the boat rolling and pitching.

I heard a tramp steamer about two miles.

We then sailed ahead of a tramp steamer.

Speed of each ship about 10 knots.

200 yards away. Could not hear anything except the roar due to water noises from Haulp going through the water.

I gave the job up as the diff is absolutely useless when ship is underway.

We now sail into dock at 79th St. arriving there at

7 P.M.

Today's test was seven hours continuous running at a speed of 13 to 14 knots per hour.

The total time column was on bow of Hansli while under way was approximately 30 hours which is equivalent to about 400 miles.

The maximum speed attained was 17 knots.

I am now convinced that the principle of propulsion is O.K. and that the affair will stand up in any kind of a sea that the Hansli can stand.

Will have column removed from bow as soon as I get some photographs taken to show the construction in cut

the column to the Hanoli.

I wrote up a typewritten report of complete test for Mr. Edgson.

Purchased a scrap book for keeping behavior records.

May 26

Went aboard the Hanoli (by automobile).

Had Burns and Linder along.

Had Linder take photographs of column.

We then removed column and placed on the dock. Had a truck ordered from Lab. to take same in.

We return at 3 P.M.

We also take recording instrument back to make a better motor for same and

to make some other changes.

May 27.

Am laying out the slot
for bottom of column.

Burns checked up the record-
ers.

May 28.

Had an operating table
made to finish up the column
on.

Had photographs of
recording instrument taken
in various positions.

Am arranging records
in scrap book.

May 29.

Burns is making ten
guides for putting tubes in
column with.

Am having new irons
made for top of column.

June 2,
Am having four taper
tubes made as shown on
opposite page.

June 3,
Am laying out a new
motor for recorder.

June 4,
Got word that we could
keep the Hauloli.

June 5.
Had new irons put on top
of column and had bearings
thinned up properly in shop.
I went to the Hauloli to get
measurements to make new
crossmembers, the old ones
were bent due to the improper
alignment of the bearings.

Am having a portable
sound proof booth made
in lab, as shown on opposite
page.

June 6.
Am making an attachment
for recorder to make the
ordinary adding machine
paper work.

June 12.
We need about 1000 feet
of paper to use in future
tests.

June 13.
I gave Mr. Meadowcroft
report and photographs of appar-
atus to send to the Navy Dept.
as requested by Mr. Edison.

Tape tubes are finished.

June 16.
I had a letter sent to the
Miller Rubber Co to hasten the

shipment of sponge rubber.

June 18.

Booth is finished.
I am continuously after
the Esty wire people in regard
to the wire netting which we
have not yet received.

June 20,

Received the wire at 2 P.M.
brought same over to the
Manhattan Rubber Co. and
got a promise of one week
on the job.

The specifications of the
wire are as follows.

18 feet long.

48 inches wide.

#12 gauge.

Not 20 and 22 brass wire.

weight 6.3 lbs.

72 sq. ft.

June 23.

Am having elbows of the proper angle made to use in connection with large rubber pipe from top of column to booth.

June 24.

I went aboard the Hauli to bring letters to Capt Harris also to get measurements and to find a place for booth.

June 25

Ordered 4 1/2 ft. lengths of 5 ply gas hose from the Combination Rubber Co.

Am having steam line laid to table for vulcanizing rubber.

June 26.

The new motor on recorder runs 7 1/2 hours with one winding at 500 R.P.M. of governor.

July 30.
Wire inserted rubber
arrived.

Cut same and prepared
it for putting the sponge
rubber on.

Burns is making clamp
for shoe.

July 1.
Sponge rubber arrived.
I prepared same for cement-
ing to the wire inserted rubber.

Purchased $\frac{1}{2}$ gal of
Scales vulcanizing cement
for this purpose.

Burns worked on shoe.

July 2.
Cemented sponge rubber
to the wire inserted rubber
using one coat of Scales
cement.

Patte on vulcanizing.

July 3,
Prepared margin $1\frac{1}{2}$ inches
wide on each side of sheet
rubber for vulcanizing.

Sand a strip of rubber
on each margin.

Applied one coat of Sholin
cement after sand tapping and
cleaning with benzol.

→ June 7.
Done vulcanizing.
Purchased 1 doz. rubber
sponges from Minor Rubber Co.
in Newark.

July 9.
Fitted tubes to Ashre and
bound and soldered same to
prevent rattling.

Placed a sponge at every
3 ft. length on tubes and
installed in column by the
use of the tin chute previously
made.

Sand out a bracket to
clamp rubber to top of column.

July 10,
Drilled holes in the rubber
at bottom for putting shoe on.
Put same in place using
white lead in screws, and
between rubber and base.

July 14,
Installed Dittaphams in
shoe, using white lead on
all seams & joints, etc.
4 1/2 in. rubber hose arrived.

July 15,
Finished clamp on top of
column.

Ordered 4 1/2" brass tubing
to use as connectors for
rubber hose.

Am having spacing clamp
made to use on the 7" tube
so as to make a clear passage
way between cables and
stays for tubes.

July 16,
Got brass tubing 4 1/2 in. cmf

also $\frac{3}{4}$ " soft rubber tubing.

July 16.
Myself and Burns are grain-
ing up parts of recorder to be
packed in a crate made to
ship columnar.
Captain Harris called up.

July 17.
Tried to get Capt. Harris
on phone but could not.

July 21.
Mr. Meadows left had
truck ordered to leave for Tuesday
morning.

July 22.
Shipped apparatus by truck
to the launch at Sachawanna
dock at Hoboken.

Myself and Burns went by
auto with recorder etc.
Went from Hoboken to
93rd St. and anchored in the
Hudson.

July 24.
We are installing the
new parts on the outtrigger
hoisted to Sandy Hook
dock.

Am having a derrick
made for the purpose of
lifting column pump in
water to test also for putting
same in place on the outtrigger.

July 29.
Put column in water at
10 A.M.

Tested for leaks by letting
a weight attached to a string
drop down each tube.

All diaphragms, joints etc.
are water tight.

Let it stay suspended from
derrick in the water for 24
hours. Tested and found OK.

We did not put column
in place today because the
Hanoli was jolting up and
down, the water being rough.
There would be danger of the
outrigger catching on column
and causing damage.

July 30.
Put column in place and
assembled the absorber.

Put elbow in place and
cut rubber and brass tubing for
connecting to the booth.

July 31.
We left Matady Hook
dock at 8 A.M. to get provisions
for Hanoli.

The column rides very
good.
The rubber bulges out
(stream line form distorted)
at the water line due to the
pressure of the water.



The heavy outline is the original form with respect to the steel column or backbone.

Dotted line shows form the rubber assumes when ship is underway at 10 knots.

This causes a terrible wake behind column.

It also causes undue strain on the whole structure.

Speed was about 10 knots.

It seems to be O.K. at 5 knots.

Arrived at Bensonhurst at 9:30 A.M.

Decided that it will be necessary to make clamps to keep rubber from bulging out.

It would also be advisable to make a ^(metal) guard for the nose of column in order to distribute the pressure which is great at the water line, also to protect rubber from coming in direct contact with sticks and other floating debris in the water.

There is a lot of debris floating in the water at times and it is impossible to steer the boat clear of same.

Tested tubes for leaky at end of run. found O.K.

I also inspected the form of the rubber from waterline to shoe, and found that the greatest distortion was just below the waterline, it was O.K. near the shoe.

Will return to lab. and make gaug. and clamp.

Aug. 1.
Went in Lab. and ordered 1/2" and 1/8" sheet brass for delivery to day.

Aug. 2.
Had small commercial car ordered to take stuff to Bensonhurst Monday morning.

Aug. 4.

Met Burns in Newark and purchased some more $\frac{3}{4}$ " rubber tubing, also brass screws.

Proceeded to Bensonhurst arriving aboard Tanoli at 11:30 A.M.

After coaling ship and watching W. proceeded to Sandy Hook dock, arriving there at 5 P.M.

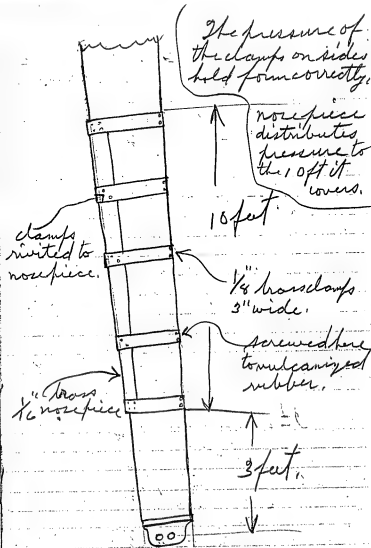
Wernum slow (gas shot) so as not to distort rubber too much.

Aug. 5.

Rigged up detrich, removed column from outrigger and placed it on the dock.

After straightening the rubber we formed the nose piece and clamps.

Riveted clamps to nose piece.



The column has been in the water until now for 168 hours. It did not leak a drop. Harold has been under way about 5 hours of this time.

Aug. 6.
Finished clamps.
Put column in place at 11 A.M.

Left Sandy Hook dock at 2 P.M. for Bensonhurst.

We run at about 5 or 6 knot speed because of a dense fog.

Column rides O.K.
It does not bulge out at water line now.

Coming in Bensonhurst we run at 10 knots for a short time.
Everything is O.K.

The column leaves quite a wake at 10 knot speed, in spite of its stream line form.

Water was very calm. We did not take any behavior records.

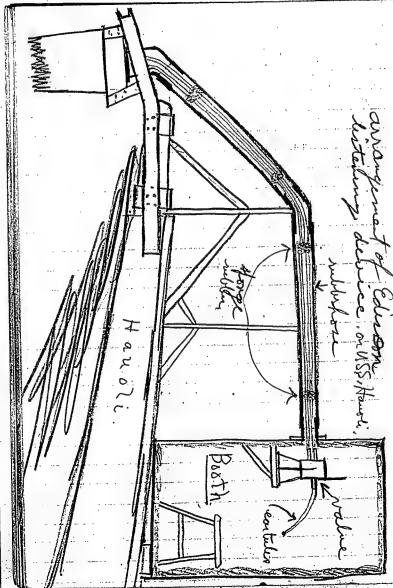
While under way at half speed, I sat on the outrigger and listened in.

Very quiet, could hear the Fairbanks engine.

Due to the position I had to get in to listen, I could not count R.P.M.

The noise of bow wave through the air also bothered me.

Arrived at Bensonhurst at 4 P.M.



Proceeded with putting
on the tubes from top of column
to booth.

Tested tubes for leaks.
Found OK

Aug. 7
Put the booth in place
on the bow of the Hauli.

Connected up the tubes
and the rubber hose cover-
ing.

Got every thing in shape
to go out tomorrow.

The distance from the
diaphragms to the ear pieces is
34 feet.

Hooked in the port and
starboard valve in the
booth.

Using metal ear tubes.

Gravesend Bay, N.Y.

Aug 8.

Prepared to get under way
to make a run test to determine
the noise of wake (water noises)
and to get comparison of
noises between our device
and M.V. tube on Havo.

I am listening in.

Am using the combination
3 way valve, and the (Ct)
all metal ear tubes, 12 inches
long, tapering from $\frac{3}{4}$ " to $\frac{3}{16}$ ".

Pull anchor at 10:45 AM.

Very noisy.

Anchor chain running
in hose pipe makes this
noise.

Water is very calm in
bay. Beautiful day.

Recorder is not running.
Had trouble with gages
pans breaking, and did not work.

have time to repair.

10:50 Start main engine at

quiet. Device listens very

Hear a submarine chaser
crossing our bow a few
hundred yards away.

I am listening in port
and starboard sides.

I count 90 faint beats
of Harold engine.
Captain says engine is
turning 90.

The beats are very faint
and hard to pick out.
The noise is almost a
slight roar.

There is no water noise

at this speed.

Now listen in M.V. tubes
at same speed.

Tubes are very noisy.
Lot of water noises.

Engine noises are louder
than in Edison device
but not as clear

(noise is louder only
when centered).

Beats are not as dis-
tinct as in Edison device.

Now listen in Edison
device and have speed
increased to 10 knots.

Noise increases a little
the beats are in rapid suc-
cession now

Almost a constant roar

(No.) water noises.

All the noise heard is engine noise, and this does not seem to be very strong.

Seems to be distant.

Now 5 knot speed.

The noise diminishes somewhat. (Lower frequency)

Port diaphragms are very quiet.

Starboard are a trifle noisier.

This is due to the column riding a few degrees to the starboard of the vertical.

Will have to put a loose spring in the port side of the absorber.

Now listen in on the
M.V. tube, and increase speed
to 10 knots.

Terrible water noises,
Especially when Hawoli
rolls or pitches a little.

It would be absolutely
impossible to hear a ship
over the noises heard in
those tubes.

Noises are present regard-
less of position of the
compensator.

Noise is sickening.

We reduce speed to 5
knots.

I listen in on Edison device.

I hear bell. 10 rings per
minute.

Captain Harris says its
a submarine bell on the Amb-
rose light ship,

S. is two miles to our
port side,

We are sailing away
from her at 5 knot speed,

This bell is very
loud and clear,

Hear overtones clearly.

Burns listens and
hears it.

Captain Harris listens
and hears it.

Also Ensigns Allen
and Taylor,

Heard a tug boat.

Count 100 R.P.M. very plain

and loud,

Tug boat stops about
 $\frac{1}{2}$ mile away,

I now hear a tramp
steamer.

We are still running
at 5 knots speed.

I hear tramp steamer
over one mile.

Also hear bell, etc.

Had. Captain shut down
main engine and all
auxillaries, pumps etc.

We are now lying too

We are rolling and
pitching a little.

There is absolute quiet-
ness in ear tubes.

Pitching and rolling
does not cause the slightest
bit of noise.

When I state absolute
quietness, I mean it in the
full sense of the term.

Engineer now starts
the auxiliaries and main
engine in the following order
and time:

Main exhaust to condensers	11:25 PM
Circulator	11:25
Feed pump	11:25
Air pump	11:25:30
Generator	11:26:30
Blower engine	11:26:30
Main engine	11:30

The generator makes the
most noises of all the auxiliaries.

The main engine drowns
out the other pump etc.

The main engine noise is a steady roar with a beat just having a distinctness that can be heard above the roar and can be counted.

I count 92 beats.

Engine R.P.M. is 90.

The noise seems to be distant.

This is due to the position of the diaphragm with respect to the point of sound propagation, and to the fact that we are running from the sound.

The device is in the proper position acoustically.

It would not be necessary to do any cancelling out.

Am still hearing bell.
Running at 5 beats.

Havoli is pitching and rolling to some extent. This does not interfere with listening whatever. Except that as the column rises and lowers in the water, the quality of the sound varies a little.

Only the quality.

I now listen in MV tubes

Terrible noisy here at 5 knot speed.

Can't pick up the bell at all

I go back and listen in Edison device.

We are now 5 miles from ship with bell on.

I hear it very plain now

Burns hears it.

Captain Harris hears it.
Ensigns, Allen and Taylor
also hear it.

Captain Harris and myself
hears bell plain and loud at
6 miles distance running 5 knots

We got distance by bearing
of charted buoys, etc.

We now turn around and
run head on to light ship at
10 knot speed.

I am listening to pick up
bell.

When Hawoli runs at 10
knot speed, her bow vibrates
up and down a lot. This causes
the brass tubes to jump up and
down in the rubber hose.
Tubes hit hose at times
and this is bothersome.

Will have to put more

sponge rubber supports in
hole for tubes to overcome
this.

However I picked up the
bell at 2 miles distance
running at 10 knot speed,
and heard it for 2 miles after
passing it.

Best ever.

When within a few
hundred yards of first ship,
I listened in M.V. tubes but
could not hear the bell.
Could not pick it up at all.

We now come in as it
will be necessary to fix up
the tubes, before we can get
any further data accurately.

We come in at 5 knots
speed so that if column
hits anything it won't be
liable to damage.

I picked up a tug boat on
the starboard beam about
1300 yds distant, very plain
80 R P.M.

This is the best device
that I have ever listened in
on. it certainly is remarkably
quiet and entirely free
from water noises.

Burns, Capt. Harris
Allen and Taylor listened
on both the M.V. tube and
Edison device.

They said there was no
confusion.

The Captain requisitioned
a range range finder

from the Navy Department
for the purpose of getting
accurate distances in
the future experiments.

All Naval Reserve Men
and duration of war men
will have to be released from
the Navy by August 11th, this
will leave the Hancock
with a crew of only 4 men.

The captain put in a
request for enough men
to make up an operating
crew so as we can con-
tinue experiments.

It will be Tuesday
at the earliest before we
can make any further tests.

Gauvenc Bay,

Aug. 9.

Removed the ~~flange~~ con-
taining brass tubes and put
another sponge in each
length making 4 sponge
rubber supports in one
length and 3 in the other.

Corrected alignment so
that column will ride
vertical.

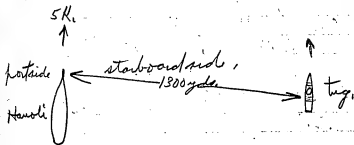
Made out a report to
send to Mr. Edison.

Buns left for home.

Aug. 11.

I went in lat. with report,
returned to ship in afternoon.

Buns returned in evening.



Could not hear tug on the
port side.

Graveyard Bay N.Y.

Aug. 12.

Fixed up needles fore and
aft, and got it in working order.

Went out to listen for
ships.

Left anchor at 11:30 A.M.
Sail out at 5 knot speed.

I am listening in port and
starboard sides.

Water very calm,
just heard hauler engine.

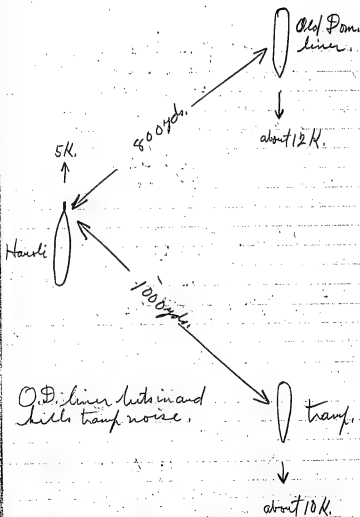
I hear a tug boat about
1300 yds to our starboard beam.

Can't count R.P.M. (his)

They are mixed up with our
own boats R.P.M's.

Can't discern him on our
port diaphragms.

I hear a bell buoy.
The bell is not clear through
the tubes, it sounds like a dull



third,
I guess it is the sound of
the clapper transmitted through
the framework into the water.
(The bell is in the air)

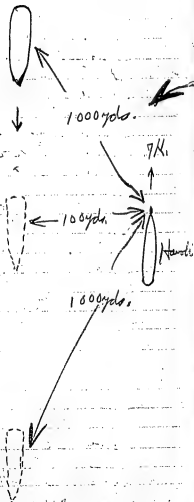
Can hear the third much
sooner than the ring through
the air.

I hear a tramp 1000 yds to
the starboard steam.
Count 88 R.P.M., very loud.
264 beats (very rapid).
Propeller is out of water.

An old Dominion liner
buts in.
I hear her plain, 72 R.P.M.
Beats are slow, very loud.

I hear a liner on the Port
bow, 1000 yds distant.
We pass her 100 yds to beam.
I lose her 1000 yds to
port beam.

Liner,
running about
12 knot speed.



We are running 7 knots
now.
I count 153 beats (51 R.P.M.)
Beats are fast.
There is one very loud beat.

Hear another ship 1000
yds. to port bow.
Count 240 beats.
60 R.P.M.
Loose at 800 yds to port
steam.

(Similar to previous case)

Hear Ambrose lightship
bell very plain. 10 rings per
minute.

We are now running at
5 knot speed.

I hear a very loud roar.
It's the Northern Pacific
maneuvering to take on a pilot
500 yards away.

Northern
Pacific

running
about 17 to 20
knots



2 miles

arrowhead
indicate
direction.

Hawli

Hawli running at
5 knots

Terrible noisy, cracky,
steady roar,
~~the~~ the turbines.
We stopped.

We turn and run forward.
I want to get distance that
I lose it on our steam,
Running 5 knots.

Northern Pacific starts up
again.

Very loud noise.
Something like a torpedo
only of a lower character.

Still hear bell.

N.P. is 1500 yds away to
our bow.
Very loud yet.

I hear N.P. to 2 miles away.

Other ships butt in.

Can't hear bell any more.

Northern
Pacific

running
about 15 to 20
knots



2 miles

arrowhead
indicate
direction.

Hauli

Hauli running at
5 knots

Terrible noisy, cracky,
steady roar,
the hauler turbines.
the stopped.

We turn and run from bell
I want to get distance that
I lose it on our steam,
Running 5 knots.

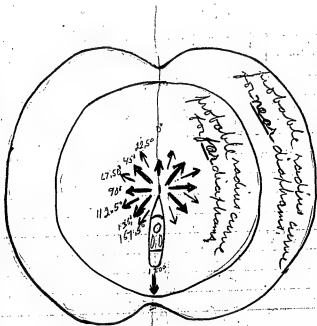
Northern Pacific start up
again.

Very loud noise.
Something like a torpedo
only of a lower character.

Still hear bell.

N.P. is 1500 yds away to
our bow,
Very loud yet.

I hear N.P. to 2 miles away
Other ships butt in.
Can't hear bell any more.



Get distance sound can be heard at all the above positions at 5 knots speed.

Get nearest diaphram distance and for diaphram distance.

Then get distance at various speeds.

too many ships around interfering.

I lost bell at 4 miles distance. I wanted to get the distance bell could be heard when Havel was running to and from it at different angles, as shown on the next page.

Also wanted to see how the sound diminishes as the speed of Havel is increased.

It will be necessary to get this data electrically.

So that we can confine our tests to a closer area to the source of sound, and to eliminate the interference of other ships.

(Cut down sensibility!)

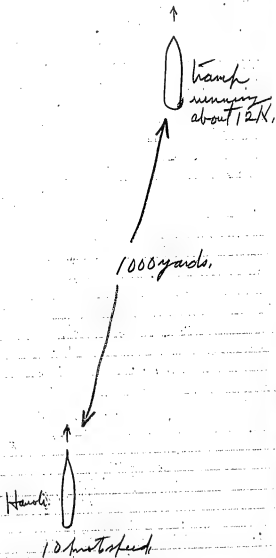
Can't do this out here today.

We wait a tramp steamer.

We run at 10 knots speed.

I count 16.5 beats.

She stopped to take on a Pilot.



She starts again and we run after her at 18 knots speed.

I hear her for 10.00 yards to our bow.

She is running much faster than we are.

Other ships interfere such as tugs etc.

Can't do much out here today.

We now come in.

Had recorder running. It run about $\frac{1}{2}$ hour and, one of the main springs broke.

I will go in lat. tomorrow and get electrical apparatus 1 stage and ion etc.

Captain says He will go to Navy Yard to get range finder

Gravesend Bay.

Aug. 13.

Myself and Atkins went in to
Lab.

Brought the following material
by Ford car to Hauler.

1 Stage and ion.

3 Bell receivers.

2 Head sets (receivers)

Weston volt ammeter

2 Rex boxes.

50 ft. wire.

2 and ion bulbs. V type.

2 straps of $\frac{1}{8}$ " brass.

Photographing for records.

Gaveend Bay.

Aug. 14, 1919.

Repaired spring in recorder
and got same in running con-
dition.

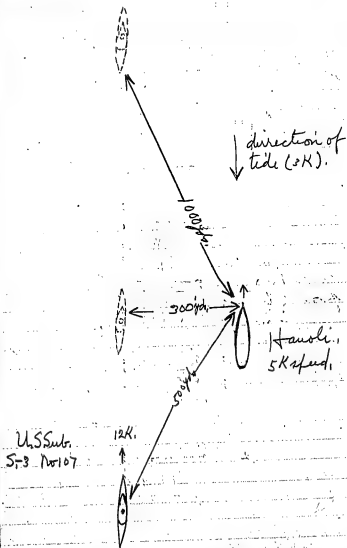
We intended to go to Sand-
Hook today to put on extra floats
on column.

It is so stormy that we
could not tie up to the dock
there so we decided to go
to 79th St. dock on the North
river.

We left Bensonhurst at
2:45 P.M. en route the blower
engine broke down.

We were towed in to our
dock by a navy tug arriving
at 7:30 P.M.

While we were coming in
the lower bay running at 5
knot speed a U.S. submarine
(S-3 No. 107) overtook us.
She passed us on our port side
running at a speed of about 12 K.



I listened in and heard her about 500 yds. to our port beam, she passed about 300 yds. abeam.

I lost her at 1000 yds. to our bow, a tug interfered between Hawoli and Sub.

While in tow coming up the North river the same submarine passed us coming down the river.

We were being towed at about 3 to 4 knots against a tide of from 3 to 4 knots.

Sub was running about 12 knots.

I heard her when she was about 500 yds. to Port beam.

Ferry boats and tugs interfered.

The sound was a steady roar similar to the sound of the Northern Pacific, but of a somewhat lower character.

Aug. 15,

Found that the brass shoe
on the bottom of column was bent
to one side.

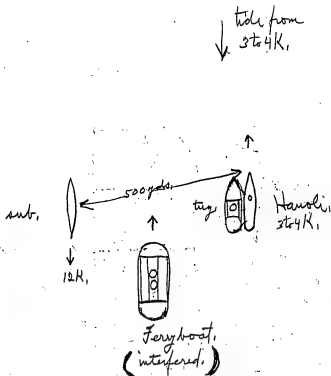
This was caused by the anchor chain hitting & going to the ground. The ship was swinging with the tide at anchor in Gravesend Bay during the storm of the 13th and 14th of Aug.

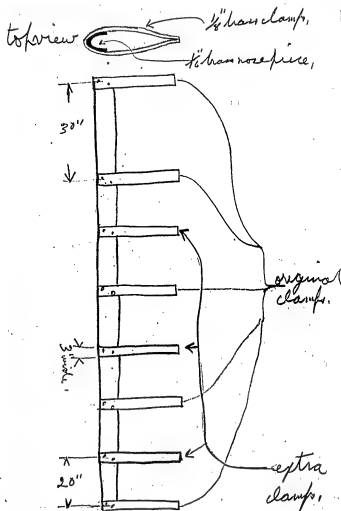
We removed the shoe entirely from the column to straighten the tubes.

We also removed the nose piece with clamps on.

Found a large dent in the
press. nose piece where it had
come in contact with a piece of
wood.

If it were not for the pro-





traction of the clamp, the rubber would have been injured.

We put three more clamps in place on nose piece as shown on opposite page for the purpose of further protection and to give column a better form.

Aug. 16

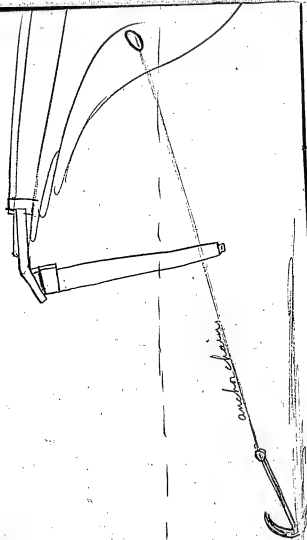
Removed kink and straightened up the lower part of tubes where they were bent.

There was no damage done as the result of the chain cutting the rest of the column.

The rubber covering is still intact.

Purchased screws and white lead to assemble shoe again.

In the future we will have to keep tied up to a dock as much as possible, the chain in order to hold a ship while at anchor in (HST)



a storm it is necessary to let out anchor chain to a length of about 3 to 4 times the depth of the water. When the chain is tight it lays at a sharp angle and this would always be dangerous to our apparatus.

During calm weather the chain lays on the bottom as the weight of same is mostly enough to hold the ship.

Myself and Burns left the home in the afternoon.

Captain Harris had the broken parts of blower engine sent to Naul of and for repair.

When repaired we are going to Sandy Hook dock.

Hudson River New York.

Aug 18.

Myself and Burns returned
to Hauli.

Wet weather today.

Aug 19.

I went in Lab. to see Mr.
Edison.

Burns is putting new
clamps on more pipes.

Returned to ship in the
afternoon.

Fixed up diaphragms in
the brass shoe.

Aug 20.

We put latrines in place
on column, also put stove
in place and got every
thing in readiness to move
to Sandy Hook dock.

Two more men left the
Hauli today leaving only
19 men in the crew now.

Fixed up a bank of lamps
to ~~provide~~ assistance in
charging batteries for the
auditorium.

Engine parts have not
returned yet.
Expect them tomorrow.

Aug. 21,
Repaired engine parts
came from Navy Yard.

We charged our batteries

Captain got a letter state
ing that range finder has
been shipped from Washington.

We are now waiting
for coal.

Order of tests, to get sufficient data on device.

- No. 1. Get speed of the Hauler, relative to the engine R.P.M. (Do this before putting the column in place)
- No. 2. Get ranges of audibility of device at various angles off ship with respect to the source of sound. (Use some constant source of sound).
- No. 3. Get ranges of audibility at various speeds of ship.

Sept 14/19.

Left Sandy Hook dock at
8 A.M. proceeded outside to
wards Ambrose lightship.

Count 80 R P M of Hanoli
engine. (very clear)

Hear a tug very loud
about 300 yds, to four star
board side.

Increase speed of Hanoli

I count 160 R P M.

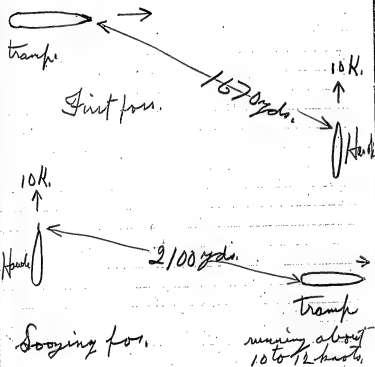
(160 R P M is 10 knots)

Noise heard is purely
engine noise and does
not seem to be very strong.

Weather is fine today.

Water is calm.

I hear a tramp steamer



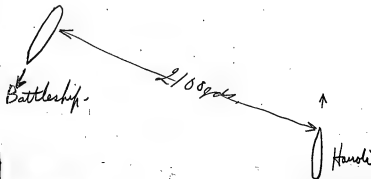
sailing at right angles to us, crossing our bow. I pick up the sound at 1670 yds.

I hear her plainly to 2100 yards, to starboard.

Cannot count her R.P.M., they are mixed up with ours.

I pick up the sound of an Italian battleship at 2100 yds. distant.

There are other ships around that interfere now.



Going head on to
Ambrose light ship.

I cannot pick up bell

Bell not ringing.

We asked Captain to ring
bell.

Bell started at 9:43 A.M.

We start away from light
ship at 9:45 A.M. At 10 knots
speed.

Bell is terrible loud/near
by. Can be heard about 1 foot
from ear tubes.

12 dings per minute.

We want to get the point
where we loose bell running
away from it at 10 knots

this is not right.
as speed fell below
10 knots.

We are now 5550 yds.
from bell running at 10 knots.
Bell is very clear and loud
yet.

RPM decreases to 145
(Can't keep steam up in the
engine room) for coal.

We are out of sight of light
ship, can't get range anymore.

Lost bell after listening
for 40 minutes.

At 10 knot speed the dis-
tance should be

→ 14,815 yds. or $7\frac{1}{2}$ knots.

We stopped engine.

I hear bell again very
plain.

We continue course

away from bell at $5\frac{1}{2}$
speed. 98 RPM engine.

We have to get distance by
the position of ship on chart

This distance I hear
bell at 5 knot speed is
indicated on chart by the
numeral **I**

This distance is approx-
imately 6.5 knots.
or 13.171 yds.

We now continue to
sail away and stop main
engine to learn distance
bell can be heard.

(But leave auxiliaries
running)

This position is shown
on chart by numeral **2**
and is approximately 7.5 knots.
or 15.197 yds.

We now face head on
to bell, to determine the distance
in the opposite direction.

Lying too (aspirinium)

No. 2 is position, etc.

We now present our
port beam to light ship.

I hear the bell very faint.

It seems to be about the
same intensity at all the
above positions.
(Lying too)

We now sail abreast of
of light ship, back and
forth coming closer each
time.
speed 5 knots RPM. 90.

Position 3 on chart
shows distance. 7 mi. 14/82 gals.

We start at a buoy that
is exactly 8106 yds from
the light ship.

Sail away with steam
to light ship to repeat the
first test.

Speed 10 K. RPM 15-4.

Hooge bell suddenly
3000 yds from buoy.

The distance is 11106 yds
from light ship.

Position 4 on chart shows
this distance, which is 5.4 knots
or 11106 yds.

We now reverse course
and head for light ship

time 1:21

Speed 10 knots.

1:26 2100 yds

1:27 1610 "

1:29 1150 "

I cannot hear the bell
any more. (Not ringing)

We run in to the light
ship.

We pull along side of
light ship and ask keeper
what time he stopped his
bell.

He said 1:15 PM.
This is time I lost bell
at 300.0 yds from buoy.

Captain asked keeper to
continue ringing bell until
we return.

Bell starts at 2:32.

We run away from ship
at 1:40 PM. & make speed.

Increase speed to 10 knots
at buoy 4 miles from bell

120 R.P.M.

Hear bell 2400 yds, fast
buoy. 10506 yds from light ship.

Turn ship and head for
bell, at 10 knot 160 RPM.

Pick up bell 2400 yds. from
buoy.

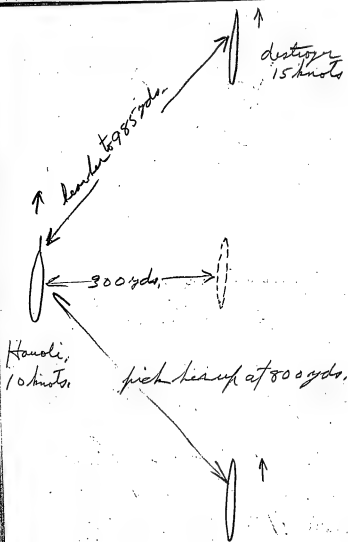
Sail ahead of light ship.
Hear bell at 2400 yds. from
buoy. 10 knot speed. 160 RPM.

We now run in near
light ship, to listen to some
ships.

There are not many ships
running here today.

We are getting information
to listen to a U.S. Destroyer
No. 153.

She is overtaking us on
our starboard steam.



We are running 10 knots
160 P.M.

She is running about 15 K.

I hear her 800 yds to starboard steam, and hear her to 985 yds, to our starboard bow.

Sound steady roar.

(Turbines)

He passed up at 300 yds, to our starboard beam.

Terrible loud at this point.
(roar)

A destroyer cannot be heard at a great distance. It must be due to their shallow draft.

We get all the distance with the range finder.

Barr & Stroud make

F.G. type No. 11.

42 inch base.

Northern
Pacific!



pick her up plain at
3500 yds.



Hausli
1.5 knots

Big passenger boat coming
out.

I hear her dead ahead at
3500 yds.

We are running 10 knots.

Very loud at 2250 yds.
drown out our own boat noise
entirely.


She stops to drop Pilot.

Terrible cracking noise
can't listen to it. (continuous)
cracks.

We stop, and wait for her
to start again.

It is the Northern Pacific.
(Turbines)

Hear pilot boat running
Northern Pacific starts up
again.

↑

 Northern
 Pacific
 running about
 15 knots

just hear her at 3500 yds.

↑
 Handi.
 10 knots

We are 690 yds. from her
 We start up.

Terrible racket

We follow her at 10 knot
 speed 160 P.M.

Noise getting weaker.

Still very plain and
 discernable at 2700 yds.

Scratchy noise like diaph-
 rams rubbing along sand.

I hear her to 3500 yds.

All the foregoing data
 was obtained by listening
 direct with ear tubes.
 (No amplification)

I will construct charts
 to show the relative ranges
 of audibility at various

speeds of ship.

Also the ranges when
ship is at the various pos-
itions relative to the point
of sound propagation.

Below are some of the ranges
on bell for quick reference.

Max. distance lying too.

^{11.5} Miles (actual)
1'5-19.7 yds.

Max. dis. at 5 knots.

6.5 Miles
13171 yds.

Max. dis. at 10 knots.

5.45 Miles
11106 yds.

Return to Sandy Hooklocks
arriving at 6.30 P.M.

Removed device from
outrigger and sailed into
the lower bay.

Anchored overnight
in lower bay.

Sept. 15.

Proceed into dock at
Brooklyn Navy Yard to
coal up.

Myself and Bunsight
Havoli for Lab.

Reported to Mr. Edison.

He wants all lab.
equipment removed from
Havoli.

Buns. is to do this.
I am to continue on

the storage battery job.

[ITEM(S) FOUND IN BOOK]

May 18
6

start New S. and L.
2:35 PM ~~stop~~
roll and pitch record
change wire.
stop at
blue ink in roll
real is pitch
stop at 2:41.0 P.M.

Race point light, 3:20
stop record, ~~3:30~~ 3:30
heading 60 S 1/2 E.
change course due S.
4 to 7 min 30 sec.
south wind.
change course S 1/4 W, 4:5

May 19
2

Block Island sound
change course S 1/2 W.
4:12

3:19 PM changing
course continuously
enter F.P. Bay. 4:21
~~stopped and~~

stopped engine 4:30
dropped anchor at 4:32
stopped records, 4:36
maneuvering.

[ITEM(S) FOUND IN BOOK]

7 1/2 Pond Bay, ^{ing 20 mi.} at 6:22 AM
start record. 6:33
water dead calm.

start full speed 6:35
speed about 12 K,
light east wind.

B. sound.

6:55 1/2 A.M. changing course
air layers stopped 6:56

changing course 7:2

" 7:3

change course SE 1/4 E.

7:4 1/2 A.M.

Montark light ahead

7:19 1/2

swells

approaching outside 7:24 1/2

changing course 7:25

May 20.

No 2

about 2 miles out in area
of Montark Pt. 7:32

heading SE 1/4 E.
RPM of engine 7:40 AM
200

heading SE 1/4 E 7:43

changing course 7:44

West by South 7:46 1/2

sailing ahead of the

swells. on W by South course

beautiful weather.

slow at 7:58

stop record 8 A.M.

course W by S. con-
tinuously.

[ITEM(S) FOUND IN BOOK]

No 3. May 28
stat record at 11 AM,
ships position, 7 miles West
of Shinnock light
" heading, W. by S.

Eng. R. P. M. 210.

stop record at 11:30
ships position ^{about} 16 miles
heading W. by S.

← 1.8 miles SV of Shinnock
light.

No 4. May 28.

3 P.M. about 7 miles
East of Shinnock light

ships heading
W. by N.
starts to rain.

Amber light ship 340
made 16 knots for a time
~~at~~ around 220

Chang boma 430
entering narrows 432

slow speed 440
half " 441
full " 441
Lower bay 448

passant of light 459

[ITEM(S) FOUND IN BOOK]

No 5. M₂ 20.

approaching Northme.

5-14

reach ~~at~~ N. at 5.45

79

trip to dock. to water up.

[ITEM(S) FOUND IN BOOK]

Data for May 26

[ITEM(S) FOUND IN BOOK]

New York
May 23, 1919.

start 12:22 P.M.,
coming down from dock
about 15 mile wind,
heading S.W. down
the North river.
water calm in river.
R.P.M. of engine 175

It was very foggy in
the river.

fog lifted about 11 P.M.
1225 P.M.

wind is the rising in
velocity, direction S by E
(about 10 miles)

of starting
1227 P.M., heading SW by S
12,70

up in N.Y. Bay, 12:35 P.M.
heading 92, 45 S.S.W.
changing course
1 P.M. Narrows,
slow speed 1/2 P.M.
lay to 1, 8 P.M. off N. Ward with.
Start again, 11:14 P.M.
1, 15 P.M. W. of in low
wave of Moro Castle.
South N.Y. Bay,
wind blowing south
1, 23 P.M.

wind about 25 miles
white caps present 25
kts.

heading S, 1/4 W, 1, 30 P.M.
Ambrose Island

[ITEM(S) FOUND IN BOOK]

3

heading S Ely S. 142

S E 1/4 S. 145

S E 3/4 E. 141

S E 156

Water broke over Bow 3.02 +

S E 1/2 E. 2.09

shot down 2.13

going out of channel

2.14 - stopped - lying to

2.29 - full speed SE 1/2 E 130

ships heading 2.45 SE 1/2 E

2.42 SW 1/4 S.

whistling buoy and light

ship between 2.48

lost land light ship 2.58

changing course 2.59

E. N. E. 2.30

stop record at 3.5 to
up air

start at 3.10

heading North 3.15

S E 1/4 S 1/2 S. 3.28

Off Ambrose Light Ship 3.35

N.W. by W. 3.43

Change course 3.48

Stop engines 3.50

Start 4.12

N.W. by W. 4.15

N. W. by W. 4.18

Change course 4.24

S. by W. 4.26

Half Speed 4.32

Full Speed 4.44

N. N.E.W. 4.47

[ITEM(S) FOUND IN BOOK]

blowing bow 5.21

blowing " " 5.33

Entering the Narrows 5.50

Passing Blaine of Liberty 6.20

crossing North River 6.29

approaching 7.9th St.

stop engine 6.55

very calm

~~tie up at dock at 7.10 PM~~

~~aboard's time 6.57~~

maneuvering 6.58 to

make dock?

tie up at dock at 7.9th St.

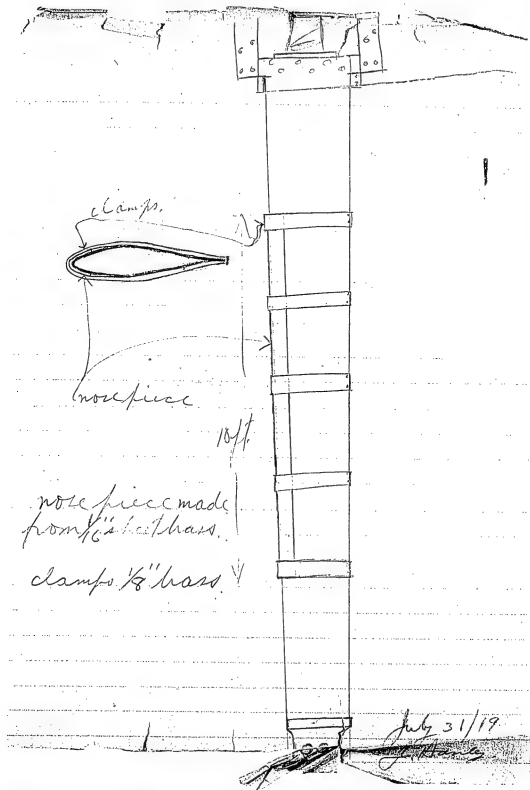
back full speed 7.6

stop record at 7.10 PM.

[ITEM(S) FOUND IN BOOK]

Dakota May 23

[ITEM(S) FOUND IN BOOK]



nose piece made
from 1/2" bass.

clamps 1/8" bass

July 31/19
[Signature]

[ITEM(S) FOUND IN BOOK]

July 31 - 1918 -

Start 5:15 turning around at 10:00
Full speed ahead 8:19
Change bars 8:27
Stop 9:15

[ITEM(S) FOUND IN BOOK]

Aug. 8, 1919

pulling anchor
at 10:48 AM, (rising)

Water very calm
start in slow engine
slow 10:50

stop 10:51

Listening in port
and starboard

hear faintly
in gas port

very faint
and in all the
until 2:45 P.M. very faint
Coastline is visible 98

2

half speed
Push quarter then
K. tubs. (Y. L. L. L. L.)

Water noise just K. tubs
at this point of view

increasing in volume

that is the sound
they come in the water

the sound is

5. The sound is

very faint and

starboard is very faint

[ITEM(S) FOUND IN BOOK]

Sept. 10 to K. L. L.
 from 12:12 P.M.

last 1/2 of 100 ppm
 on the 100 ppm
 on the 100 ppm
 on the 100 ppm

from 4 to 10 ppm
 from 100 ppm

100 ppm
 on the 100 ppm

on the 100 ppm
 on the 100 ppm
 on the 100 ppm

[ITEM(S) FOUND IN BOOK]

Stop everything at 11:22

1 20 nothing
start by

1 L3 station

127

9/23/2015

$$\begin{array}{r} 46 \\ 18 \overline{) 848} \\ \underline{72} \\ 128 \\ \underline{108} \\ 208 \\ \underline{180} \\ 28 \end{array}$$

(Rev. Engineering Exam)

1. *Chrysomelids* to *Kleber*
Chrysomelids to *Kleber*
 not from *Kleber*

Have ball placed
in your own hands

[illegible]

Aug 18th Ketchikan
found a very pretty
bird on the hill.

[ITEM(S) FOUND IN BOOK]

- 6080

an even length of
24 ft. long 2 1/2 ft. H

from across the
square to the back
of the

Port 1000
5 N. 1000 ft. 500 ft. 1000 ft.

[ITEM(S) FOUND IN BOOK]

Aug. 12, 19

11:35
 1.
 2. 20 ship
 and distinct broods
 hear ship 8.4 beats
 our own ship
 listening in both
 directions to know
 just bearings
 course of Hays
 pump is closed
 one for chimney
 for noise

2

3. 100 ship
 4. 100 ship
 5. 100 ship
 6. 100 ship
 7. 100 ship
 8. 100 ship
 9. 100 ship
 10. 100 ship
 11. 100 ship
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 95. 100 ship
 96. 100 ship
 97. 100 ship
 98. 100 ship
 99. 100 ship
 100. 100 ship

[ITEM(S) FOUND IN BOOK]

3

hear bell on foot
note not in flight
hear into a knock
quickly that thing

hear knock
hear ship 1000000
knock 1000000
with of water
rapidly beats
very loud 8 & 9 PM
dead ahead
to hear the one plain
15 old down
18 R.P.M.
7 1/2

4

17 57
57 103

slow beats,
hear bell

still hear old
dominant line
bell down on it
line
time a beat
when with a beat
time a beat
16.34 to

hear line on foot
note very loud 1000000
12 R.P.M., 17X3 beat
12.3 6 to 12:40 1000000
on short 7 1/2 beat 1000000

[ITEM(S) FOUND IN BOOK]

hear hammer blow
 lower another boat
 at 12:40 Port side
 60 R.P.M. 60x4 feet
 course 12:44
 to port stern 2000 ft

8:00
 hear ship 11 PM
 start transp
 our speed 5 K.
 hear ship 11 PM
 7 K.

6.
 hear ship
 start 11:00
 1:00
 hear ship
 sail away to bow
 listening in port and
 starboard.
 ship transp on port
 bow swimming away
 from us

Bear steady loud
 hoovering sound

[ITEM(S) FOUND IN BOOK]

7

North Pacific
backing full speed
tumble noise
500 yds away
picking up Pilot
tumble noise High
steep road
(Lump lines)
stopped
few bell plain r/y
hear another boat
port bow.

Hear N.P. again
scratchy loud noise
steady

8

similar to torpedo
noise.
about 1500 yds.
hear her to 2 miles.

our engine 92 RPM
5 K.

[ITEM(S) FOUND IN BOOK]

9

over speed
beam 2:52:30
tramp light

least a tramp steam
2:55 1:0K 4:24

tramp stopped

72 R.P.M.

1/2 mile tramp 3/4 mile
to starboard

Aug. 12. 1919

Start 1:13.0

Ahead Half Speed	11.40
" " Slow "	11.45
Change Course	11.45
Stop main engine	11.46
Ahead slow speed	11.51
" " Half "	11.52
Change Course	11.57
" " " "	12.00
" " " "	12.06

[ITEM(S) FOUND IN BOOK]

Aug 14, 1979

Getting ready to get

under way

Start recording 1:45 P.M.

raise anchor at

check recorder from 2:15

to 2:20

under way half speed 2.12

Long Range 2.15

Full Speed 2.17

Long Range 2.19

In Narrows 2.25

Long Range 2.27

" " " 2.30

Change Course 2.35

stop recording after North

river 4:45.

[ITEM(S) FOUND IN BOOK]

Sept 14/19

#

Leave Sandy Hook
dock at 8 AM.
count 80 RPM
Haul engine

Hear a tug moving
loud to our starboard
side about 300 yds.
increase speed to
10 knots.

Count 108 RPM
256 beats
count 3584 140

Count 160 RPM

The noise that
heard is purely

2

engine noise

Very calm outside
to day.

Hear a tramp
to the port boat
1670 yds.

Her RPM is
mixed with waves
cannot count.

Tramp - Counts off starboard 1300
going away from us. 2100 yds
yds still heard. cannot hear
on Port side.

[ITEM(S) FOUND IN BOOK]

104000 3

3.250

Hear Italian Battleship about 9.00
 Smiled with Cargo Boat. Cargo
 boat very loud
 Going aboard on to Ambros Lightly
~~the ship~~ Bell not ringing
 asked ship to start Bell started 9.43
 at light ship. Going away from
 Light ship at 90 knots. 9.45
 372 yds. 9.48 very loud.
 66.5 " 9.49 30 A.M.
 119.0 " 9.51 30 " "
 1.520 " 9.53 12 taps a minute of Bell
 19.55 9.54.30 A.M.
 Hear better on starboard than Port side
 still going 10 knots. Light ship moving
 on Port bow.
 4.020 yds. 9.59 still very plain

10,000.00

speed increased 10.00
 3.5.50 10.04 still very plain
 Distancing on Port and Starboard. 10.05
 Speed decreased 10.08 A.M.
 7000 10.09 A.M.
 1.45 P.P.M. 10.13.30
 Hear bell plainly
 On ~~the~~ side of them 10.15
 10,000 not sure of range cannot see
 Light ship on account of haze 10.19
 Lost track at 14.50 10.23

Still in haze 10.25
 picked up bell again
 very plain.
 continued course at

[ITEM(S) FOUND IN BOOK]

5

5 knots 90 R.P.M.

at 10:27

100 RPM

1 beam Bell very plain 10:28

1100 overboard of Bell very plain

8 Turned Boat around

We are now steaming away from light ship
light ship at 5 knots beam Bell

Plain 10:28 94 R.P.M.

1045 100 R.P.M.

1048 82 R.P.M.

1055

Lost Bell 10:55

No. 1 on Chart Indicates Position Lost

6

Steaming away from light ship

to determine distance 11:10

Range of ship firing Light 11:22

Can just hear
bell (Hansel's
to) and light's running
position of Hansel
is dead head on
light ship.

Position is shown
by No. 2 on chart.

We now get position
ahead of light ship
Port side ahead
hear bell about the

[ITEM(S) FOUND IN BOOK]

7

8200 C.

We now turn away
from light ship and
lay to.

can just hear bell
about like same
intensity (very weak)

We now turn ahead
of light ship.

back and forth
coming closer each
time, port and star
alternately.

speed 5 k. 90 turns

count 100 RPM.

8

RPM. back 92

12' 20" hear bell
faintly but in
position 3 or 4
5 k. 100 RPM.

1100' start from buoy
4 miles from light
ship and railway
with steam to bell
at 10 k.

I count 145 RPM

Engine room 154

Mount 152 RPM.

[ITEM(S) FOUND IN BOOK]

9.

Range from buoy

3000 yds.

10 Knot speed

just hear bell
fourteen 4 or 40

reverse course

and back for

light ship

11 21:30

about 140 RPM

2100 from Buoy 1 26 P.M.

1610 " " 1 27 " "

1435 " " 1 28 " "

11 50 " " 1 29 " "

Bell does not say anyone 130

we stop main engine to find out

10

Bell does not say

change motor very good.

2 P.M. running to light ship at 10 knots

at 140 RPM

2:17 P.M. off light ship going down

asked shipkeeper what time he stopped

Bell heard 11:5 P.M. 2:21 P.M.

2:20 230 light ship was asked what time

light ship Bell is continue sailing

Sub Bell until we returned. Bell

started 232 300 light ship at 10 knots

134 RPM 2:37 P.M.

140 R.P.M. 2:47

140 " " 2:57

140 " " 3:05 off Buoy station

675 yds of Buoy station 3:08 P.M.

[ITEM(S) FOUND IN BOOK]

3:25'30" **22**

2400
810
10536

9 35.4 gals 3.0.9

2400 " 3.11

158 R.P.M. 2.14

Turned ship around Port side to 913

Shull speed on 10 knots ahead 3.20

2400 gals from Bury 3.20

17000 gals from Bury stopped ship 3.25

Now heading Right angle to light ship Port

side to 1480 gals from Bury 3.32

R.P.M. 160 time 3.33 P.M.

Heading towards light ship at 10 knots

3:35 P.M.

160 R.P.M. 3.33 P.M.

Light change at 3.35 P.M.

Hear bell at 160 R.P.M.

stop of engine ~~etc~~

12
abeam ¹² 4:00
in ship 4:12

at 4 mile from
very plain

Now running in to
light ship & beam at
160 R.P.M. 4:12
time ship 3:48

Hear bell loud 3:50
light ship & range 3000 feet

3:55 V. say loud 160 R.P.M.
against the tide

arrived at L.S. 4:17

4:20 160 R.P.M.

Stand-By-Keel for
raising bale

[ITEM(S) FOUND IN BOOK]

13.

Getting a Position in Eastern U.S.S.
 Destroyer No. 153. 4.39 P.M. of
 8th. Stern 2 Points. Our Boat making
 110 R.P.M.
 Hear loud steady Roar.
 300 yds. of 8th. Side 4.38 P.M.
 Very loud about 1 Point of 8th. Bow
 400 yds. 4.43 P.M.
 5.23 5.47
 Sound diminishing at 5.50 yds
 5.48 P.M.
 Cannot hear anymore 4.49 P.M.
 9.55 yds. 4.49 P.M.

74

Buzzards Boat Betty Big 2 sticks
 5.500 yds 5.05
 160 R.P.M. 5.06
 3500 yds. Dead ahead 5.07
 2250 Betty Big 2 sticks 5.09
 1710 very loud 5.10
 Drawing our own missile 5.10.20
 Terrible working taking of 5.11
 Our Boat stopped 5.12
 Name of Boat Northern Pacific
 Hear Pilot Boat moving slow
 N.P. started terrible noise 5.13
 690 yds 5.16
 following N. Pac 10 knots
 640 yds 5.17
 1020 loud on only noise 5.18
 1270 5.19

[ITEM(S) FOUND IN BOOK]

15

1700 gas	5.20
Our P.P.M. 160	5.21
2200	5.21
2700	5.22
Since getting it out still have seriously	
now	4.23
2.500	423.30

[ITEM(S) FOUND IN BOOK]

$$\begin{array}{r} 3445\frac{2}{3} \\ 6080 \overline{) 103352} \quad 17 \text{ miles,} \\ \underline{6080} \\ 42556 \\ \underline{42566} \end{array}$$

$$\begin{array}{r} 14815\frac{2}{3} \\ 5280 \overline{) 44445} \quad 8 \end{array}$$

[ITEM(S) FOUND IN BOOK]

stopped 4.23 to fix engine
started engine

230 Ambrose channel
off Kochang

1194

Range came 20 miles East of Ambrose.
11.25. Heaving E $\frac{1}{2}$ S.
E $\frac{3}{4}$ N. 100 fathoms.
100 fathoms.

[ITEM(S) FOUND IN BOOK]

1 P.M.

ships heading E.N.E. $\frac{1}{2}$ E.

12 miles ~~SE~~ of Fair Island.

3 P.M.

ships heading E.N.E. $\frac{1}{2}$ E.

Shinnecock light.

(14 hours before)

~~start of tide at 4.5 P.M.~~

Heading N. ~~E~~, northeast.

~~at 7 P.M. to 8 P.M.~~

W. Namagasset.

[ITEM(S) FOUND IN BOOK]

Departure taken from Entrance to Sydney Channel
Boat #2 on Star Line, Course ESE time 8:16
80 minutes

Boat while Sea passed ahead 9:14 course ESE
Auntie light close ahead 9:33 " ESE

Changed course coming about back
to right ship stopped again. Then
heading out to sea, against Auntie
close ahead course SE 9:49

SEAE 9:49 8 KM
SEXS 10:13

Boat passed ahead 10:28

Stopped 10:26 full lift ladder

Boat 1090 yds away 10:37 course SEAE
5 knots

11:00 full speed ahead. Stopped at 11:09 30

11:15 Swinging 180° Half speed. to Co. S. NW X N

11:19 finished swinging stopped.

11:24 Half speed course NW X N

11:25 stopped.

11:29 ahead half speed Co. NW X N

11:31 stopped.

11:36 90° to Starboard to Co. NEXE

11:40 finished swinging stopped.

11:45 Swinging 90° Half speed to Co. SEXS

11:48 finished swinging. Stopped

11:52 Ahead half speed Swinging 90° to SW X W

11:56 finished swinging course SW X W 1/2 speed

11:58 Swinging 90° to NW X N Half speed 5 KM

12:00 finished swinging ahead half speed.

Continued 90° more to NEXE

12:04 finished swinging

11:35

[ITEM(S) FOUND IN BOOK]

- 12:04 Changing course to NW x N
90° left Half Speed.
- 12:09 Changing course to SW x W 90° left
half speed.
- 12:12 Changing course to NW x N 90° right
half speed.
- 12:14 Changing course to NE x E 90° right
half speed.
- 12:25 Changed course to NW Speed 5-kts
- 12:35 Changed course to NW x NW " "
- 1:08 Mthawk buoy abeam.
- 1:10 Changed course to SE x S Full Speed
- 1:14 890 yds from buoy

- 1:15 - 1100 yds from buoy.
- 1:16 - 1310 " " "
- 1:17 - 1530 " " " Submarine bell Ambrose.
- 1:18 - 3000 " " " Ship stopped ringing.
- 1:23 - Changing course to NW x N Full Speed
- 1:27 - 2100 yds from buoy.
- 1:28 - 1610 " " "
- 1:29 - 1435 " " "
- 1:30 - 1150 " " "
- 1:31 - Stopped & main engine.
- 1:34 - Steered NW 3/4 W Full Speed.
- 1:37 - Changed course NW x W 3/4 W Full Speed
- 1:38 - Changing course to NW x N Full Speed.
- 1:52 - Changed course to NW 3/4 W

[ITEM(S) FOUND IN BOOK]

- 3.20 Ambrose Light ahead
3.32 Course SEXS Trull speed
3.53 Changed course to SEXE
3.05 Changed course to ESE
3.06 Molokai buoy ahead
3.09 645 yds from buoy
3.09 Changed course to SSE Trull speed
3.10 935 yds from buoy
3.11 1095 " " "
3.12 1400 " " "
3.14 1630 " " "
3.15 1820 " " "
3.15 Half speed ahead
3.16 Changed course to ESE

[ITEM(S) FOUND IN BOOK]

4:45 Course changed to SE 1/4 E
 4:46 ~~4:46~~ 153 ahead on same course
 4:47 Course changed to SE 1/4 E
 4:49 " " " EXS 1/4 S
 4:50 Disturber 985 yds away ~~Lead on starboard~~
 changed course to Starboard to WAS at 4:52
 4:55 changed course Star. to NW 1/4 W
 4:55 changed cor to NW 1/4 W
 5:07 changed course to W 1/2 N
 5:10 changed to port to SW at 5:11
 USS Northland 1710 yds away ~~Starboard~~
 5:12 course changed to port ~~Starboard~~
 Slow ahead
 5:15 steady on SS ahead half speed
 5:16 ahead full speed
 5:18 USS N.P. 690 yds. star board
 5:19 course changed to S 1/4 E ^{USS N.P.} 840 yds away
 5:19:30 SS 1020 yds away
 5:20 " 1270 " " J
 5:21 " 1700 " "
 5:22 " 2200 " "
 5:23:30 " 2700 " "
 5:25 " 3300 " "
 5:28 changed course about to NW 1/4 N
 5:38 " " " NW 1/4 W
 5:45 " " " NW 1/4 W
 5:46 " " " NW 1/4 N
 5:48 " " " NW 1/4 W
 5:57 Entering Gedney channel
 Bow #1 ahead heading in

[ITEM(S) FOUND IN BOOK]

6:02 Buoy #3 passed abeam.
6:10 Buoy #2 passed abeam.
6:15 Buoy #2A passed abeam.
6:20 Buoy #4 passed abeam.
6:24 Buoy #6 passed abeam.
6:28 Buoy #1 passed abeam.

[ITEM(S) FOUND IN BOOK]

Fort Wadsworth S X W $\frac{1}{2}$ W
 Statue of Liberty NNE
 Robins Reef Light N $\frac{3}{4}$ W
 SHIP HEAD SW X W $\frac{1}{2}$ W

$$\begin{array}{r}
 3026 \overline{) 14415} \quad 4.9 \\
 \underline{12104} \\
 23110 \\
 \underline{27234} \\
 5280 \\
 \underline{334910} \\
 37150 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 6080 \quad 3 \overline{) 6080} \\
 \underline{55} \\
 30408 \\
 \underline{30408} \\
 5280 \\
 \underline{334910} \\
 37150 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 6080 \quad 7.5 \\
 \underline{75} \\
 30408 \\
 \underline{42568} \\
 5280 \\
 \underline{43600} \\
 4224 \\
 \underline{3360} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 6080 \quad 7.5 \\
 \underline{75} \\
 30408 \\
 \underline{42568} \\
 5280 \\
 \underline{43600} \\
 4224 \\
 \underline{3360} \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 6080 \quad 7.5 \\
 \underline{75} \\
 30408 \\
 \underline{42568} \\
 5280 \\
 \underline{43600} \\
 4224 \\
 \underline{3360} \\
 \hline
 \end{array}$$

Barn & Stroud.

Box 4/2 in.

Mark 3

$$\begin{array}{r} 2087 \\ 6080 \\ \hline 3040 \\ 42560 \\ \hline 45604 \\ 3224 \\ \hline 3528 \\ 36913 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \overline{) 15.280} \\ \underline{11} 0 \\ 42 0 \\ \underline{33} 0 \\ 88 \\ \underline{88} \\ 0 \end{array}$$

$$\begin{array}{r} 34452 \\ 31680 \\ \hline 27720 \\ 26400 \end{array}$$

[ITEM(S) FOUND IN BOOK]

1

Boat Ward Boat Station 11/11/44

30. tank Vesta

Hotel Daniel Vessal. About 8/12/36

800 yds at 1240

Water level of Water 2 ft

off Port bow 12.4 - Samland Barge
none

Big Black Pass and Barge

Ship Prop 1 ft out of water 245

Misc. - U.S.S.B

NAME

Std Oil Tank with one Barge in tow

about 300 yards away 3.25

Barge Boat 3/4 of mile away 3.50

[ITEM(S) FOUND IN BOOK]



KNIGHTS OF COLUMBUS
WAR ACTIVITIES



CAMP

131

Shut down.

- | | |
|-----------------|-------------|
| 1 Main Engine | at 1:30 pm. |
| 2 Generator | at 1:22 pm. |
| 3 Air Pump | at 1:24 pm. |
| 4 Circulator | at 1:24 pm. |
| 5 Blower Engine | at 1:24 pm. |
| 6 Fuel Pump | at 1:24 pm. |

Started up.

- | | |
|---------------------------|----------------|
| Main Exhaust to Condenser | at 1:25 pm. |
| Circulator | at 1:25 pm. |
| Feed Pump | at 1:25 pm. |
| Air Pump | at 1:25:30 pm. |
| Generator | at 1:26:30 pm. |
| Blower Engine | at 1:26 pm. |
| Main Engine | at 1:30 pm. |

Full Speed 180 R.P.M. = 10 knots

Half Speed 90 R.P.M. = 5 knots

125 R.P.M. = 7 "

[ITEM(S) FOUND IN BOOK]

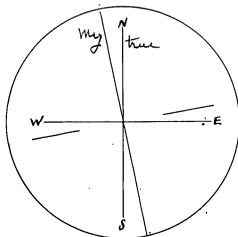
Rockaway

40° 28'
40° 25'

Ambrose channel
Bedney channel

Sandy Hook
Highlands

[ITEM(S) FOUND IN BOOK]



Ambrase Lightship

Mahawk
wreck →

buoy

*4

*1

*3

*2

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments
Submarine Detection Books**

These four notebooks were used by E. Rowland Dawson, William Deans, William A. Hayes, and Sherwood T. (Sam) Moore during 1917-1918 for experimental work done for the U.S. Navy. The experiments are related to those in the A. M. Kennedy Books. Include are notes on transmitters, receivers, and audions. Some entries pertain to work done at sea on submarine detection. There are also experiments with sound detection and recording. Some books contain notations regarding Edison's comments, suggestions, and instructions. There are also a few rough drawings by Edison.

N-Number

Labels and Inscriptions on Front Cover

Selected Books

17-04-21

"Dawson"

18-03-29

Books Not Selected

18-06-15

18-10-03

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments
Submarine Detection Books
Notebook N-17-04-21**

This notebook was used by E. Rowland Dawson during April-May 1917 for notes on experimental work done for the U.S. Navy. The experiments are related to those in the A. M. Kennedy Books, and some are continuations of experiments in Books #3 and #4 (N-17-04-05 and N-17-04-01), performed by Dawson while Kennedy was in Alabama. Included are notes on transmitters, receivers, and audions. Also included are experiments on funnels for direction finding. The notes indicate that Dawson reported to Edison through William H. Meadowcroft. The front cover is marked "Dawson." The pages are unnumbered. Approximately 40 pages have been used.

73498

Stone Co.,

MFG. STATIONERS,
96 JOHN ST.
AND
19 PLATT ST.,
NEW YORK.

ER Dawson

Trans # 1 = Small B4 Bell
" # 2 = Large Eb "
" # 3 = Break wheel & cello + tele.
" # 4 = Dinner Bell

Receiver # 1 = Straight Bell Tele-
" # 2 = Bell tel with tube
" # 3 = Bell tel in brass
case, attachable horn

Report to Mr. Edison through
Mr. Meadowcroft
Expense account to R W KELLOW
Charge acct 5005

To Charge batteries

BA = 16 amps 7 hours

BR = 8 " 7 "

MO = 1 " 7 "

1.75 to 1.8 volts required per cell

April 21/17

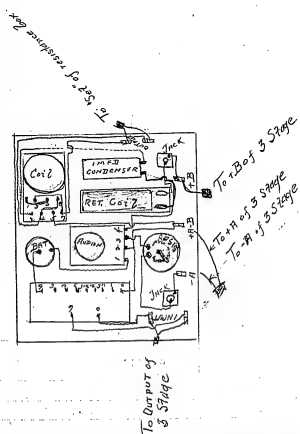
Kennedy left yesterday for Alabama. Telephoned Mr Meadowcroft's office to that effect and said I would continue work here unless I received orders to the contrary. Also wrote him and Mr Edison to that effect last night.

This morning, no orders having been received, we started out. Fog heavy but presumed it would lift shortly which it did.

Meanwhile however, we had run on bar near Island Beach, Tide running out and to remain all day waiting for it to come up and float us off.

Got off at 4³⁰ but wind had come up and conditions were not good for making tests.

Sketch of 1 Stage Audion with Connections



SPST Trumbull switch left of 3 stage controls L+N resistance on outside of box. When switch is closed resistance is shunted across input. Close it when reading "Low" on left hand SPDT Trumbull switch.

Two other Trumbull switches control the "10 lavite resistances mounted on base". On low these resistances are in the circuit, on "High" these resistances are shorted out. As the switch to right is kept on high all the time, this switch and corresponding resistances could possibly be eliminated.

Apr 22/17

Frank didn't show up. Went out with Andy alone.

Direction Test

Horn pointed direct at bell and at 90°

Receiver # 3 with funnel

Trans. # 4 (dinner bell)

Weather fine - Very little wind
100 yards

Pointed straight { Low 46
High 60

90° Couldn't hear
Wind had come up a trifle
Pointed straight (on reading) Couldn't hear

50 yards
Pointed straight - Can just hear
on High at 0 intermittently

Tried Trans # B. Could hear but weak

Thought it looked like bat trouble
Tested with voltmeter. Appeared ok.

Found ends of wire running to
under water phone, oxidized. Scraped
them. Improvement slight.

Examined all connections and
looked for water behind diaphragm
in phone. all ok.

Next tried new A battery in spite
of voltmeter. Bell rang over side
which I could hardly hear before,
nearly broke my eardrums

Test to find value of funnel
as direction finder.

Ring bell from ship and
swing boom on launch so
that funnel points directly at
bell, 90° from bell and directly
away from bell (180°)

Transmitter #4 (dinner bell)

Receiver #3 with funnel

Weather conditions ideal

50 yards:

Straight	{	High 60
		Low 60
90°	{	High 72
		Low 70
180°	{	High 34
		Low 18

100 yards

Straight	{	High 44
		Low 32
90°	{	High 14
		Low 8
180°	{	High 24
		Low 12

Apparant discrepancy between
90° and 180° Made 90°
second time and got

90° { High 36
Low 16

125 yards
Straight { High 30
Low 26

90° { High 28
Low 22

180° { * High ?
Low faintly at 2

* Noise has increased slightly

40 yards

Straight { High 60
Low 56

90° { High 46
Low 34

180° { High 44
Low 28

Test = Horn Off + Horn on

Trans #4; Receiver #3
Weather Conditions ideal

HORN OFF

75 yards Can't Hear
50 " " "

But get trans. #2 OK.

40 yards Low 6 faintly
 High ?

On a second reading at 40 yds
could only get at zero on Low.
So 40 yards is apparently the
limit with horn off.

HORN ON

40 yards

High 52
Low 40

75 yards

High 38
Low 34

175 yards
High ?
Low 6?

Noise greater now than in
last experiment

3:15 PM

Direction test to verify

previous
Trans #4 Receiver #3 with horn

Weather Wind blowing in
Hard puffs. Looks like
squal coming
Receiver Noisy

75 yards
High 28
Low Can't hear

Hear Bell #2 at 50

50 yards
 Straight { High 46
 Low 37
 90° { High 22
 Low 16
 180° { High 6
 Low ?

Noisy during all above readings
 When puff of wind would come
 bell works lost entirely.

75 yards
 Straight { High 60
 Low 46
 90° { High 30
 Low 18 faint

180° { High 30
 Sudden lull - Very quiet { Low 8*

* Heard also a boat which I
 didn't see. On investigation
 saw tug about a mile across
 the bay.

Tried taking horn off
again but didn't seem to
make so much difference.

75 yards

Horn On

High	60
Low	60

Horn Off

High	60
Low	58

Began to rain and sky looks
gloomy. Stopped at 30

Apr 24

Only one man on boat. Rain and NW wind. Worked on boat at pier in morning.

Connect lead wire to rubber in anticipation of using tripod wrapping connections with gutta percha, covering thickly with Chatterton compound and making all fast with Chatterton to tape covering end of phone, and wrapping outside with tape.

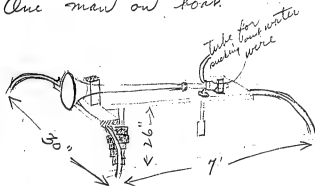
With cable on, audious very noisy incessant roar. Replaced cable and #3 with #2 and rubber covered wire. Everything OK. Decided to replace cable on #3 with rubber covered.

In removing Chatterton, pulled loose Chatterton & tape holding old connections and broke short rubber covered wire off short.

Couldn't fix myself so caught
6 o'clock train for Orange
and got Taylor to fix. He
made two small cushions and
fitted them over ends sticking
up, then soldered long wire
into cushion. Covered with
gutta sercha, chatteredon and tape

April 25

One man on boat



Wood T with pipe legs. Rope fastened around both tripod and funnel leading to boat - 100 feet away.

Launched apparatus with boom as usual before using the above to see if things were working in good shape.

Then sank funnel and tripod. Things much quieter. Noise sounds deadened - more steady and solid.

Noise not annoying as it
was before.

Resistance boxes (1 to 60 atuff)
seemed to make less difference.
Hear tug clearer than ever be-
fore.

Sea rougher boat rocking
— practically no difference

Gent shiff out, listening to it
as far as I could hear on
zero. Then signaled Andy to
ring bell #3. Heard it easily
at 60. So the bell is a bit
easier to pick up than shiff.

Number of big gun shots
at Proving grounds makes
little impression under the
water.

Paddle wheel steamers appears
to make noise— not a distinctive
sound like tug, and very little
of that.

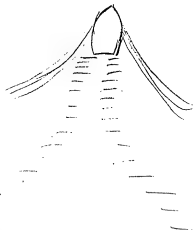
Patten and Albertina passed and could distinguish nothing but possibly an increase of noise when at the points where tugs had been conducting.

When Patten passed, it took 5 minutes for swell to reach us and it was about 1500 yards from channel. Patten meanwhile had gotten a mile forward.

After 1st swell which made boat rock violently, there was still then 5 separate sets of swells of 4 or 5 each. After this water was rougher than it was before boat had passed.

Andy says first swell was bow swell and the others stern swells. There are two distinct swells as

according to him. One from
bow which goes off side-
ways and swells which fol-
low the boat and travel in
same direction.



He says he has known
area where we were, to be
disturbed an hour after
steamers had passed. Im-
agine flats which are all
ground there, have lot
to do with it.

Tide also — They are
greater in low tide

Apr 26

Hard rain all day. East
wind. Did not go out.
Only one man at boat

Apr 27

Sun is out but N.W. wind is strong
Will try it in the bay but am afraid
will be too rough there. Second
man on boat
fume on boat

Stopped at first buoy in
river as weather was very
threatening.
Test. To find value of
extra heavy diaphragms.

Receiver #2 Trans #4

300 yards
Weather fair.

Something seems wrong with
resistance boxes. Conducted these
tests with boxes out relying
on ear.

Reg. bell diaphragm
Hear only at intervals.
Knocks and frying in Rec.

A = .060 Slow. Heard noise
like exhaust of gas boat.
It slowed down and died
away just as boat does
when stopping. No boat
in sight. after this pretty
quiet and hear bell very
distinctly

B = .040 Not as quiet as A
about boat stopped but hear
bell clearly

C = .032 Very little difference

D = .020 Hear bell but not
as clearly. Noise very much
greater.

Reg Bell (Repeat) Can't hear
bell - Noise much louder

Took resistance boxes' levers
off and cleaned them. Boxes
now work OK and audions
are much more noisy on
low numbers but noise is
out entirely at 40

Test to find if we hear
propeller on engine of skiff.
With funnel in air and
skiff running up and down
40 yards away, get explosions
of exhaust and noise.
Not a musical sound. No
rhythm except puff puff.

With funnel etc submerged
get rhythmical whurring
sound that sounds like a pro-
pellar and think it is

1000 yds
Trans 2 Rec #3
with diaphragm A

Hear at 3L High
Can't hear on Low
Frying at times

500 yds
Low 1L
High 44

Omit

Omit.
Neglected to suck water into funnel

Distance Test

Trans # 2

Receiver # 3 Diaphragm A-060

Weather - East wind - Long rolling
swell which rocked boat considerably.
Funnel etc sunk on tripod
Anchored half way between bell
 buoy and Allan High Pier.
Audious very quiet and
steady. Undoubtedly would have
been big fun if launched by boom
with reg bell diaphragm.

400 yds

Saw 30
High 46

700 yds

Saw 32
High 52

1200 yds

Saw 30
High 44

1800 yds

Saw 26
High 32

2200 yds
High 38
Sow 20

2800 yds
Sow 18
High 38

3000 yds
Sow 14
High 38

3400 yds

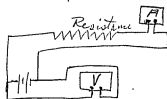
Can't hear

Unable to account for discrepancies between 400 + 700 and 1800 + 2200

Caught propeller about 2000 yds as ship was coming in

Practically no noise at all during about readings and launch was rocking considerably

To Test Batteries for
Being Discharged



For B₂ resistance should
be such for 10 cells average,
should be about 8. Voltage 12

For B₄'s 16 Amps + 12 Volts

May 2/17

Kennedy in Orange.

Station - near old pier Sandy Hook

Test - To Find Value of Funnel
as Direction Finder

Trans # 4

Rec. # 3 with funnel and tripod
launched from boom.

Weather Good.

60 yards
Straight { High 60
 { Low 60
90° { High 60
 { Low 48

85 yards
Straight { High 60
 { Low 50
90° { High 56
 { Low 48

Trans # 2

200 yards

Straight	High	60
	Sow	42
90°	High	55
	Sow	42

600 yards

Straight	High	52
	Sow	40
80°	High	50
	Sow	38

800 yards

Straight	High	38
	Sow	20
70°	High	40
	Sow	20

1000 yards

Straight	High	38
	Sow	16
90°	High	34
	Sow	12

1500 yards
Straight High 28
Saw 12
90° High 38
Saw 12

2000
Straight High 28
Saw 6
90 High
Saw Can't Hear

May 12/17

Test to Find Value of Mica
Diaphragms with Soft iron
Centres 1" in diameter

Tran # 4

Receiver # 2

Weather Good

Distance 75 yards

Regular Bell Diaphragm

Low 36

High 52

.009 Mica Centre .004

Disc towards Magnet

Low 34

High 46

Disc away from Magnet

High 54

Low 38

.005 Mica Centre .004
Disc Towards Magnets
Low 38
High 58

.004 Mica Centre .004
Disc away from Magnets
High 48
Low 34

Disc Towards Magnets
Low 28
High 46

Build Up .010 Mica. Two layers
.010 Mica and one of .013 Iron
Low 14 } Noisy
High 28 }

.004 Mica .013 Centre
Continuous Roar Can't Hear

.011 Mica .004 Centre
Disc away from Magnets
Can't Hear

Built Up .004 Mica, two
Layers .004 Mica one of .004
Iron

High	54
Low	36

A M Kennedy
101 Cloverdale Road
Montgomery Ala

NOTES

Tug seems louder running broadside to us than running stern on.

It will be necessary to get used to one listen to the sound continuous made by a submarine so that one recognize the sound.

Batteries ought to be connected with switch so they can be cut off when not in use.

**Notebook Series -- Notebooks by Experimenters Other Than Edison
Navy and Wartime Research Experiments
Submarine Detection Books
Notebook N-18-03-29**

This notebook was used by William Deans, William A. Hayes, and Sherwood T. (Sam) Moore during March-April 1918 for experimental work done at sea on submarine detection. Included are notes on experiments with sound detection and recording. Several entries contain notations regarding Edison's comments, suggestions, and instructions. There are also some rough drawings by Edison. The book contains 27 numbered pages, some of which are blank.

Wm. Dean
Key West.

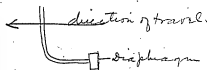
75428
Deane Co.
MFG. STATIONERS,
96 JOHN ST.
AND
19 PLATT ST.
NEW YORK.

March 27th

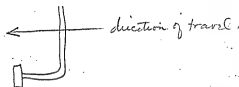
"Trench over side of launch

Apparatus 8" inside dia. brass pipe
rubber diaphragm.

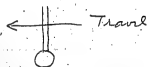
1 Diaphragm pointing backward.



2



3



For quietness with boat in motion #2 is undoubtedly the best. #1 and #3 are about the same - Very loud.

#2 is comparatively quiet but still there is enough noise so that the detection of any noise is impossible.

With boat still but engine running any position gives the same results. Can hear noise of own engines loud enough so that outside noises could not be heard.

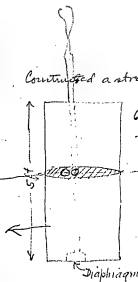
Standing still with engine shut down there are no outside noises except a water gurgle and conditions are about the same as working from dock with perhaps less local noises.

A depth of about 4 feet seems to be the best. For depths of 4 feet and above the conditions are about the same. A depth of 1 ft or 4 ft 6 in. is then about the best depth at which to work.

Speed of boat in water while in motion about 7 knots per hour.

April 3, 1918

Constructed a stream line device as shown.



Tried out over side of launch.
At 3 knots/hr. there is hardly any noise. At 5 knots/hr. noise was reduced about 90% compared with noise using bare pipe. At 7 knots noise increased a little and at 10 knots the noise is very much less than the noise with the bare pipe running 5 knots. Not still there is too much noise to detect the slight noise made by a boat.

The noise of the engine in our own boat could be heard up to 5 knots.

This device does not create much disturbance in the water. Two men held it with less effort than holding the bare pipe at 5 knots.



The water banked up in front of the device for a distance of about 9 inches (as shown to the left above) when travelling 10 knots/hr. It did not create a great disturbance in the water. At the stern there was

a small wave set up, about 18" astern, where the water seemed to come together from each side. There was, however, no pocket at the side except at the stern where the water was about 2 inches lower than the water level.

April 4th.

Tried stream line apparatus as above with boat moving and tried to listen for standard Bell. I found that the bell could not be heard while the engine of the boat was running whether the boat were moving or not.

Tried a still test - apparatus stationary. Heard standard Bell distance of 250 feet.

April 4th.

Apparatus #1



One diaphragm.

Apparatus #2



Two diaphragms.

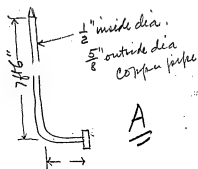


Apparatus No. 1 Bell heard by Hayses 610' by Drane 690'
 " " 2 " " " " 660' " " 650'

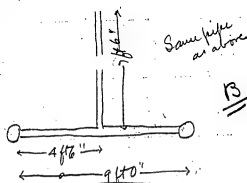
No difference for distance.
 distance 650 feet.

High tide, still water.

10



A



B

Supporting disks for rubber 16 - $\frac{1}{4}$ " holes

11

I

April 5th.
Tried pipe as in A (opposite page) (one rubber diaphragm).
Distance 640 feet.

For pipe as in B — two rubber diaphragms.
Distance 675 feet.

With this pipe the position of the diaphragms with respect to the source of sound makes no difference in the intensity of the sound heard.

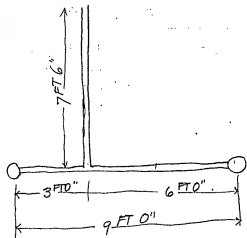
II With mica diaphragm 0.005 in thick between pipe and hearing tubes.

With single Diaphragm apparatus.
Distance 550 ft.

With Two Diaphragm apparatus.
Distance 550 ft.

Standard Bell used.

High tide & still water.



Diaphragms and disks same as in previous
apparatus — 16- $\frac{1}{4}$ " holes

April 6th

With apparatus as shown on opposite page
the Standard Bell can be heard 650 ft.

There was no difference in the intensity of the
sound heard for revolution through a complete
circle about a vertical axis than the upright pipe.

14

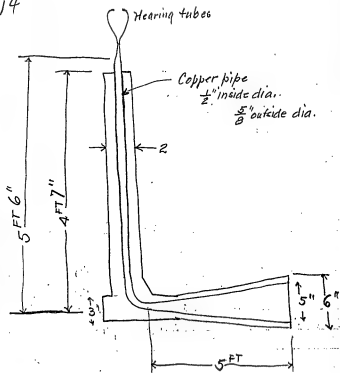


Plate in mid (wide mouth) of horn $\frac{3}{16}$ " thick
 contains 277 $\frac{1}{16}$ " holes dia. of enveloping
 circle = $5\frac{5}{16}$ "

Ratio Sum of area of small holes to area of one
 of dia $5\frac{5}{16}$ " = 61.7%

$$\frac{277 \times (\frac{1}{16})^2}{(5\frac{5}{16})^2} = \frac{277 \times (\frac{16}{85})^2}{16 \times 7225} = \frac{377 \times 16}{7225} = 61.7\%$$

sq in dia. $16 \times 5.77 = 91.5"$

15

April 8th

With apparatus as shown on opposite page.
 Standard Bell can be heard 400 feet.

Same results with thin rubber, tightly and
 loosely stretched and with heavy rubber, tightly
 stretched.

Mr. E. says - try same apparatus with
 cylindrical device extending 30" from end of funnel.
 May 4 & 5 min.

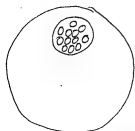
April 12th

Tried out above apparatus fitted with hood 50" long.
 Horn Standard Bell 750 feet. Removing hood reduces
 distance bell can be heard to 550 feet. Actual ring
 of bell can be heard.

Tested apparatus A of page 10, with mica
 diaphragm .015" thick. Distance 750 feet. Actual
 ring of bell can be heard very clearly.

Water very calm - high tide still water.
 May 4 & 5 min.

We found that when horn with hood on is pointing at bell
 the sound is louder than for any other position. When
 the horn points perpendicularly at the bell, the sound heard is more
 distinct than for any other position.



Each disk as follows.



16 - $\frac{1}{4}$ " holes.

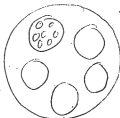
Ratio aggregate area of small holes to area one $1 \frac{3}{16}$ " dia = 71%.

Apr. 10th

Experiment given by Mr. E.

Have diaphragms made up in mouth of horn.

Each small one to be like other small ones.



April 13th

Tried this device with nine diaphragms but at 500 feet distance, the diaphragms leaked and with water in the device, the test had to be discontinued. Hood used on horn.
Mica 1 1/2 / 1000.

April 14th

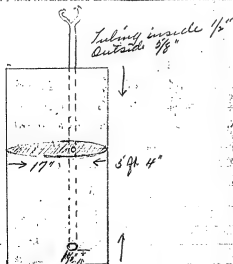
Tried the above device fitted with rubber diaphragms. Could hear bell 865 feet.

Then tried the single diaphragm, small pipe, apparatus, as shown at A page 10, for comparison. With this device the bell could be heard the same distance viz 865 feet.

Hood used on large horn apparatus.

Water - calm - high tide. Water was very clear - could see bottom through 28 feet of water.

Outside noise very slight. Mica 1 1/2 / 1000.



Holes in brass disc $\frac{1}{16}$ "
16 Holes Spaced $\frac{1}{16}$ " in thickness

April 16th 1918 19

Trid. out device as per sketch on opposite page. with diaphragm on side instead of bottom as on page 5. also used mica $1\frac{1}{2}/1000$ in thickness instead of stretched dental dam rubber.

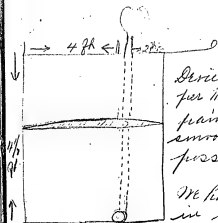
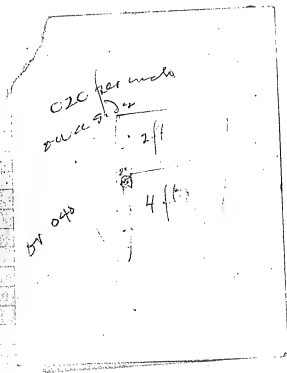
Placed man ringing bell on long dock and using Callum Lammick we made numerous tests at different speeds in order to ascertain the distance bell could be heard.

We found water noises almost nil but could get boat noises very plainly.

At 3 knots could hear bell 253 feet
at 6 " " " " 253 "
" 10 " " " " the noise of our own engine was so great we could not distinguish bell sound

Diaphragm on side much more sensitive than on bottom

Reported to Mr E. and suggested new device as per sketch enclosed page
Hayes + Morris



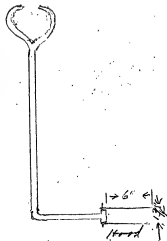
Device made of wood as per Mr. E. Skelton on top of page painted to get as smooth a surface as possible

We had no difficulty in turning this

Diaphragm apparatus and could hear the bell at 600 feet, with launch running about 6 knots.

The diameter of bore was 2" at widest point.

Hardly any water noise but could hear engine of launch plainly but did not present hearing of bell.



Pipe measured $\frac{1}{2}$ " inside
 " " $\frac{3}{8}$ " outside and
 metal copper

April 18, 1918 23

Made trial with device as per
 sketch on opposite page and
 while the water was being rough
 was able to hear bell 800 feet

Then took hood off and best I could
 get was distance 675 feet

When hood is on water waves are
 reduced at least 50%

Made Trial with device same as
 above only reduced to $\frac{1}{8}$ thickness
 and $\frac{1}{8}$ " holes instead of $\frac{3}{16}$ " and
 could hear bell 450 ft with hood
 and 275 without hood.

A mud displacement was used
 $\frac{1}{4}$ of 1000 thick

April 19 1918 25

Made up diaphragm following
 Mr. E. instructions. same set
 used in standard. 16-1/2 holes
 and 1/1000 mica. Then put
 test on mica covering a hole
 with brass rod 1/8" diameter and
 found same would stand
 weight of 6 lbs 9 oz. before
 distorting mica

April 20 1912

Made tests of 3 different lengths
of hood 6" - 12" - 18" and
found that 6" was best
getting 850 ft. 12" was next
best getting 800 and 18" the
last was 1450 feet.
The longer the hood the nearer
the bill.

Made glancing attachment to
place over diaphragm



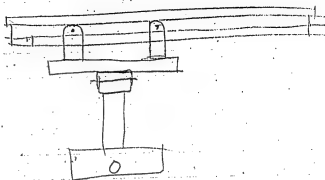
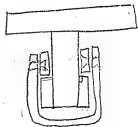
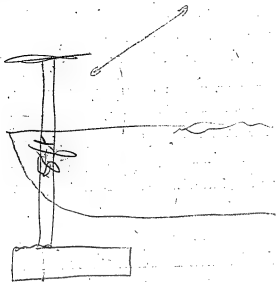
and found it measured diaphragm
very much getting bill at 175 ft.
Then put 6" hood-on and could
get 210 ft. only

Try again as Mr. C says there must
be something wrong

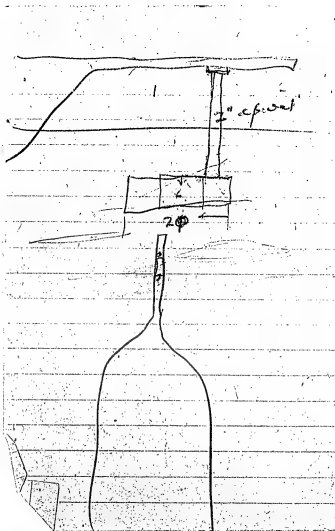
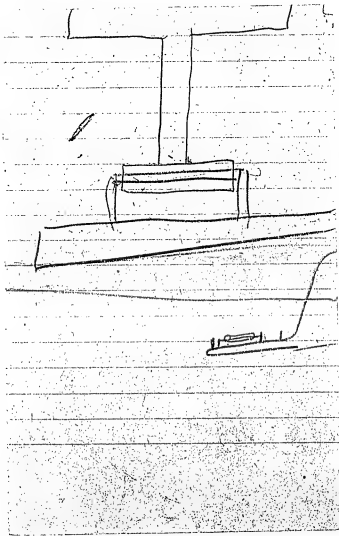
SSD - Loose Bell - still / 1946



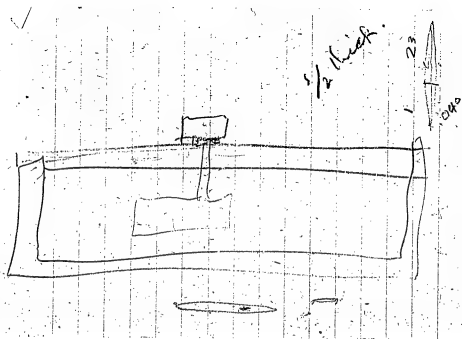
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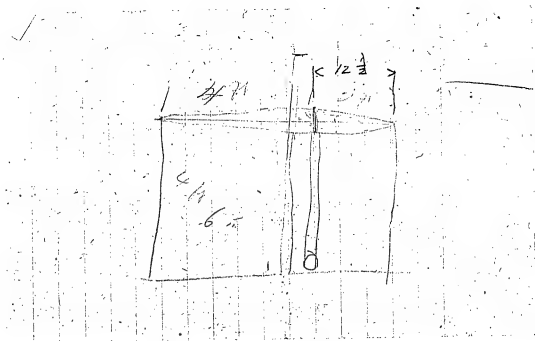
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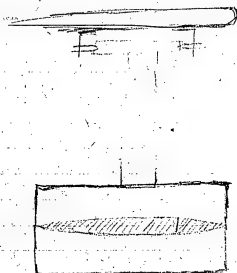
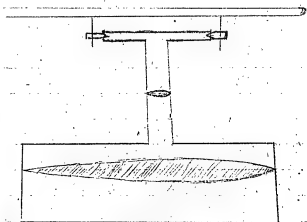
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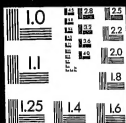


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